1993

# The agenda-setting relationship between the news media and public opinion: the case of global warming 1988-1992

Craig Warren Trumbo
*Iowa State University*

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by

Craig Warren Trumbo

A Thesis Submitted to the

Graduate Faculty in Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

Department: Journalism and Mass Communication
Major: Journalism and Mass Communication



Iowa State University
Ames, Iowa

1993

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# I. INTRODUCTION

## A. The Nature of the Investigation

This thesis is an investigation of the relationship between the mass media and public opinion. For just over twenty years, mass communication researchers have been studying this relationship under the rubric of agenda-setting. This thesis will embrace that approach.

Agenda-setting is a term applied somewhat loosely to a class of research which seeks to unveil relationships between what the mass media portray as important and what the public considers to be important. This line of inquiry grew out of social scientists'

interest in the effects of the mass media on society. The central question in all agenda-setting studies is: Do the mass media influence what we think about, and what we consider to be important?

To consider this question, agenda-setting researchers utilize a wide variety of approaches. There is some flexibility in the way researchers have defined "agenda." Methodologies have covered the spectrum, ranging from cross-sectional examinations of a set of issues to longitudinal studies of a single issue. A few researchers have used experimental methods.

The great variety of approaches to agenda-setting research is simultaneously a blessing and a curse. The researcher may benefit from the freedom to be creative while suffering from the lack of strict theoretical guidance. Further, although the body of research in agenda-setting does offer clues addressing *what* is happening between media and opinion, it does not generally answer *why*. Critics of agenda-setting have not let this condition go without comment.

Nonetheless, agenda-setting has yielded valuable insight into the dance of media and opinion. The two decades of investigation have delineated a set of conditions under which relationships between media and public opinion seem to be fostered. Certain methodological approaches seem to reveal such relationships best under certain conditions. And perhaps most importantly, the relationship between media and public opinion has come to be seen as dynamic and bi-directional.

This investigation is designed to utilize the flexibility of the agenda-setting approach in order to maximize the probability of observing the agenda-setting effect. Toward this end, this study is intended to be a validation of the essential premise of agenda-setting: under certain conditions, there is a relationship between the mass media and public opinion.

The first step in beginning an agenda-setting study is to address the question of what is meant by *agenda.* Two approaches have generally been taken, utilizing either the rank ordering of a set of issues by importance or the assigning of some variable measure of importance to a single issue. Winter et al. (1980) suggest that the aggregation of a set of issues may lead to null or weak findings because of an obscuration, or canceling out, caused by relationships between the members of an issue set. This study will therefore take the second approach, and observe the level of importance of a single issue.

Research design is elemental to the working definition of agenda. Many studies have shown that the relationship between media and opinion is dynamic (for example, Smith, 1987; Rogers et al., 1991). Although a number of researchers have had success, attempting to capture the interplay between media and opinion at a single point in time may not be the most effective technique. Recognizing that condition, this study will utilize a longitudinal design with a measure of time — the month — as the unit of analysis. Under these conditions, the term "agenda" will be defined as a measure of a single issue's level of importance across time.

This study recognizes that the agenda-setting effect is dynamic and bi-directional. Is there a relationship between media attention and public opinion? This general research question can

be resolved by addressing a set of three alternative hypotheses which share a common null hypothesis: media attention leads public opinion, public opinion leads media attention, public opinion and media attention mutually influence one another; the null hypothesis being that there is no relationship between media attention and public opinion. These hypotheses are fully specified later, in the statement of the problem.

The selection of the issue is also critical to this study. Agenda-setting studies have addressed a fair variety of issues, although issues from the political arena have dominated. Over the years, it has been observed that issues tend to fall into two very broad categories: obtrusive and unobtrusive. The obtrusive issue, one which people have direct experience with in their daily lives, seems more resistant to the agenda-setting effect. If an individual is unemployed, his or her evaluation of the issue of unemployment is likely to be independent of media coverage.

With this in mind, an unobtrusive issue was selected for the purposes of this study. A number of agenda-setting studies have used various environmental issues. This study will observe the unobtrusive environmental issue of global warming, or the "greenhouse effect."

## B. The Nature of the Issue

A thorough discussion of global warming is outside the domain of this thesis. Climate is a tremendously complex phenomenon to describe, model, and predict. Many outstanding sources exist on this topic and the reader is urged to consult one or more to attain some level of understanding of the scientific nature of this topic.[1] However, a brief overview of the problem of global warming will be offered in order to place the issue in perspective.

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[1] The following are offered as primers on climate change, in order of increasing complexity: Flavin (1989, p. 5-22); Silver (1993, p. 313-322); Abrahamson (1989); Stern et al. (1992, p. 44-100); National Research Council (1991, p. 1-26); Houghton, et al. (1990).

There is a slight semantic problem which begs resolution when discussing the greenhouse effect. The greenhouse effect, per se, is a well understood phenomenon. Certain gasses in a planet's atmosphere are effective at trapping heat energy. A deficit of these gasses (most notably water vapor and carbon dioxide) leaves a planet cold and inhospitable. Conversely, an over abundance contributes to excessive temperatures. The planets Mars and Venus (respectively) are often used as examples. Earth's specific balance of greenhouse gasses allows a planetary climate suitable for life.

When discussing the greenhouse effect as an issue, scientists, the media, politicians and others are referring to the anthropogenic greenhouse effect: a contribution to earth's natural greenhouse effect by a variety of human activities. This condition is also commonly referred to as global warming.

What is specifically at issue when the greenhouse effect and global warming are discussed is the idea of climate *change* and its attendant effects. Herein lies the controversy.

The majority of atmospheric scientists are in agreement that earth's climate will change because of human activity. Some even believe that we are currently experiencing such changes. However, the models used to describe the speed, magnitude, and specific effects of climate change are still crude. The controversy involves the timing, magnitude and exact nature of the eventual effects of climate change.

A recent survey by social scientists at the State University of New York at Albany reports that despite the disagreement over the details of predictions, atmospheric and oceanic scientists are in strong agreement over the policy issue. Approximately 75 per cent agreed that the current wait-and-see policy is wrong: current uncertainties are not sufficient to block immediate action to curb global warming ("Climate change," 1991).

Many scientists and other proponents of immediate action make the "insurance" argument to support their point. The potential results of even a medium amount of warming may be

sufficiently disruptive to the biosphere and human affairs to warrant considerable expenditure — just to avoid the risk.

The deleterious effects most often cited include disruption of agriculture and water supplies due to drought, coastal flooding from sea level rise, and the intensification of hurricanes and other storms. Also recently gaining attention is the threat to the planet's overall biodiversity. Countless species may vanish as ecological territories rapidly shift in response to changes in temperature and precipitation patterns.

Social problems can sometimes be defined by society's reaction to proposed solutions. What should be done to curb global warming? This is the question which serves to polarize the "act now versus wait-and-see" debate and defines the greenhouse effect as a social problem. Some of the solutions are seen as threats by entrenched political and economic interests. Some extreme environmental groups may have attempted to capitalize on the issue for their own political gain. The issue of global warming is, in a word, political.

As a news story, global warming is well suited for an agenda-setting study. It involves scientific and political controversy: the pitting of one side against another which seems so elemental to garnering media coverage. It involves an element of fear with which to capture the public attention. And most importantly, from an agenda-setting perspective, it is unobtrusive. It's not here yet.

Because of the unobtrusive nature of the issue, few members of the public have any direct experience with the greenhouse effect. It isn't obviously killing the lawn. Few members of the public gather their own data on global warming or have acquaintances who do so. Few members of the public have studied climate change in any depth. It seems relatively safe to say, even in the absence of supporting data, that most everything that most everyone knows about the greenhouse effect has been transmitted, directly or indirectly, through the news media.

Global warming may be an ideal agenda-setting issue.

## C. Social Science Research and Climate Change

The greenhouse effect is in a class of problems involving global environmental change which social scientists are being called upon to address. The search for an understanding of and solutions to environmental problems has generally been the province of the physical and biological sciences. However, the research community as a whole is coming to realize that efforts to understand and solve problems like global warming, ozone depletion, and the loss of biodiversity must be undertaken in some social context or be destined to fail.

> Because human activities interact with physical and biological systems both as driving forces and as critical links in feedback mechanisms, any effort to understand, much less come to terms with, global environmental change that does not include a sustained commitment to improving our knowledge of the human dimensions cannot succeed. Awareness of this simple truth is now spreading throughout the scientific community. (National Research Council, 1992, p. v)

One fundamental problem within this overall framework involves the way in which people and social systems respond to information. The importance of understanding the effect of information is outlined in a recent review of research opportunities for the social scientist working with the topic of climate change:

> Information on climate change, societal effects, and adjustive mechanisms gets filtered in a variety of ways into strategy and policy formulations. Scientific information on $CO_2$ and its effects will ultimately leave the hands of the scientific community and will be digested by the media, decision-makers, and the public at large. Unfortunately, we have little understanding of how that information will be interpreted and of the resulting social and economic consequences of its dissemination. The ways in which that information is incorporated into the decision process has enormous implications for eventual strategy or

policy choice regarding $CO_2$-induced climate change. (Warrick & Riebsame, 1983, p. 46)

Social scientists have an important role in the growing effort to understand humanity's place in a complex, interconnected environment. Humans have acquired the power to change the face of the earth in fundamental, far reaching and possibly disastrous ways. We must work toward an understanding of the human dimensions of such global environmental change.

A first order investigation addressing these concerns might seek to simply measure some social reaction to the presence of information on the issue of global warming. Does the presence of global warming on the media's agenda contribute to a public perception of the issue's importance? This study will address that question.

## D. The Purpose of the Study

This thesis will move the researcher toward two broad goals. Agenda-setting is generally considered to be a research endeavor with great but as yet unattained potential. Considerable work lies ahead in order for agenda-setting to move eventually beyond its current descriptive nature and into an explanatory mode. This thesis is an entry into that endeavor.

What are the forces which draw an issue into the public arena, define it as a problem, propel it on various agendas, and eventually cause it to extinguish? Models eventually describing such issue dynamics will be every bit as complicated, and initially as crude, as those currently describing planetary climate.

Second, this thesis is intended to be the first of many contributions to the study of the social dimensions of environmental issues and global change. The "hard" sciences have an unquestionable role in keeping the world a fit place for life. But ultimately, the real solutions will be social.

# II. A REVIEW OF THE LITERATURE

## A. Development of Agenda-Setting

### 1. Introduction

Scholars seeking to understand the social effects of the mass media have a variety of theories and models to call upon. The agenda-setting model represents one perspective through which such an understanding might be gained. Agenda-setting addresses the media's impact on people's cognitions: how do the media shape what people think about?

Theories evolve through the structured pursuit of understanding and therefore have a natural history. Because of this, behind any theory lies a path of inquiry and discovery. This path often has as much to say as the theory itself.

Agenda-setting's history is an especially lively one partly because of the nature of the question itself. The relationship between the media and society has considerable immediacy and is widely debated. Agenda-setting's history is also lively because it is effectively a theory in emergence. Only 20 years old and embracing a range of methodologies, agenda-setting is still more a model than a theory. Yet this is its vitality: agenda-setting is still on the path. For this reason it is important to examine the history of agenda-setting in order to understand its current state and to speculate on its future.

There are two developments in the history of agenda-setting which are clearly of primary importance to its evolution. Agenda-setting began as a strictly unidirectional model describing how the media affect the cognitions of individuals. Over time, however, the one-way nature of the model has evolved toward a systems perspective which allows the agenda-setting effect to flow back and forth among a number of social spheres. Secondly, as researchers have tested

for agenda-setting under a wide variety of situations it has become apparent that there are certain conditions which can serve to either enhance or retard the effect.

Taken together, these two threads of development represent the greatest strides forward during the twenty years of agenda-setting research. The emergence of a structural sophistication allows the model to address a wider variety of societal relationships. Simultaneously, the development of a set of criteria serves to define the operational boundaries of the model.

To gain perspective on the development of agenda-setting it is necessary to begin with a study of agenda-setting's origins from the field of media effects research. Then, the nature of the emerging systems perspective and a definition of the contingent conditions of the agenda-setting effect can be considered. Finally, an examination of some criticism of agenda-setting will be offered along with a look toward the future of agenda-setting in a rapidly changing media environment.

## 2. The origins of agenda-setting: Media effects research

The agenda-setting concept is the product of research into the societal effects of the mass media. The scientifically-based media effects research tradition dates to approximately 1930. An understanding of the evolution of media effects research will aid in the appreciation of agenda-setting's origin and place in this field of study.

McQuail (1988) points out that media effects research is driven by the concerns and interests of many different intellectual quarters and therefore presents little in the way of a clear path of development. Nevertheless, he agrees with many researchers who see the development of effects research falling into several distinct phases or eras.

In the beginning, as McQuail puts it, there were the "all powerful media." This was the era of the "hypodermic," or "magic bullet" theory of media effects. The idea that the media

have the ability to literally inject the public with beliefs, attitudes, and values was supported by "common sense" based chiefly on observations of the popularity of the mass media.

The notion of an all powerful media also drew support from the well-established field of advertising, the propagandists of the First World War (McQuail, 1988), and the pioneering efforts in public relations by Ivy Ledbetter Lee, George Parker, and Edward L. Bernays (Baskin & Aronoff, 1988).

At the time there was little scientific support of the hypodermic thesis. Yet, it went generally uncontested for the first third of the century. The concept of powerful media effects embodied the prevailing attitude in the early 1930s as social science researchers first began investigating the effects of the media through the application of the scientific method.

Among the first scientific tests of media effects were the Payne Fund Studies. This extensive series of 13 research projects was the result of two developments: the evolution of quantitative methodologies in the social sciences and a growing concern in society over the effects of movies on children. The studies were wide-ranging and are therefore difficult to summarize. However, Lowery and DeFleur offer this overview:

> Thus, the situation at the time (of the studies) was not unlike that faced by parents in the 1960s, when television had just emerged as a new national medium with a huge audience of children. The public was deeply concerned about effects and it wanted answers.
>
> Interpreting the findings of this massive effort presents a very difficult picture. The movies did seem to bring new ideas to children; to influence their attitudes; stimulate their emotions; present moral standards different than those of many adults; disturb sleep; and influence interpretations of the world and day-to-day conduct. (Lowery & DeFleur, 1983, p. 34)

The notion of powerful media effects was further bolstered on the night of October 30, 1938, when H. G. Wells and the Mercury Theater used the medium of radio to accidentally convince many people that the world was under brutal attack by Martians. That well known

episode in American history did little to ease people's concern over the far-reaching impact of the mass media (Lowery & DeFleur, 1983).

The concept of an all powerful mass media only began to weaken in the 1940s. McQuail (1988) describes this second phase in the history of media effects as the "powerful media put to the test." That was the year of the Roosevelt versus Wilkie presidential election and the landmark media effects study by Lazarsfeld, Berelson, and Gaudet, entitled *The People's Choice* (1948). The authors summarized their study of mass media and society:

> We are interested here in all those conditions which determine the political behavior of people. Briefly, our problem is this: to discover how and why people decided to vote as they did. (Lazarsfeld et al., 1948, p. 1)

What they discovered was that the media played a much less significant role in the flow of political information through society than had been previously believed. Investigations such as the Payne Fund Studies and incidents like *The War of the Worlds* had created an atmosphere of fear over the effects of the mass media. If the masses could be so easily swayed, what was to prevent a clever politician from introducing ideas contrary to democracy? The successes of Nazi propaganda seemed a case in point.

> The People's Choice, however, showed that conversion on this scale was extremely unlikely. The effects were not all-powerful, swaying helpless audiences uniformly and directly. They were limited effects linked to the demographic characteristics of the audience in highly selective ways. Opinion leaders, a small category, were selectively influenced by the media. However, the majority of the people remained little touched by the propaganda from the media. As it turned out, interpersonal channels brought them more influence than the media. (Lowery & DeFleur, 1983, p. 111)

A host of other media effects studies following *The People's Choice* also began to strike at the hypodermic theory. Studies further describing the two-step flow model of communication, the diffusion of information, and audience selectivity effects (selective

attention, perception and retention) began at least to suggest that the social effects of the mass media were not so simple and direct as once thought (Lowery & DeFleur, 1983). Theories borrowed from social psychology began to shed light on the reasons why people attended to the media. This new thinking suggested that individuals were not blank slates upon which the powerful media were free to inscribe.

An important study suggesting that the hypodermic model was overly simplistic was Katz and Lazarsfeld's *Personal Influence: The Part Played by People in the Flow of Mass Communication* (1955). This was a follow-up on the general concept of the two-step-flow model of mass communication which had been introduced in *The People's Choice.*

The cornerstone of the two-step-flow model is the idea that media effects do not precipitate directly onto society but rather percolate out through society and are thus subject to the intervening influences of existing social structures. The intervening social phenomena suggested to be most important in *The People's Choice* and investigated in *Personal Influence* are the small group and the influence of opinion leaders. Lowery & DeFleur offer a summary:

> It seemed to follow, then, that a member of the audience of mass communication was not an impersonal individual without effective social ties to others. More likely, the audience member was in some way *influenced* by his or her ties with others in the interpretation of mass media messages and in making decisions whether to act one way or another on the basis of such messages.
>
> Preliminary evidence from *The People's Choice* clearly suggested that it was one's family and peers that were the most important in the secondary stage of the two-step flow. In other words, the primary group was an obvious and logical focus for research aimed at better understanding the movement of messages from media to audiences via the two-step flow. (Lowery & DeFleur, 1983, p. 180)

In order to assess the role of opinion leaders and small group dynamics in the two-step flow model Katz and Lazarsfeld conducted a complex study of such influences over common

daily decision-making. The site of the study was Decatur, Illinois. The goal was to locate the source of personal influence in regard to decisions over consumer behavior, personal appearance, social issues, and the selection of what movies to see.

A variety of approaches were employed to identify the sources of personal influence over these behaviors in Decatur. Generally, the researchers sought to evaluate the relative importance of personal contacts versus media contact in the making of these routine daily decisions. Is it an advertisement or a friend's advice which prompts an individual to purchase a product? Is it a newspaper editorial or a coworker's opinion which shapes someone's politics? These were ground-breaking questions in a time when it was widely thought that the media had strong and direct influence over people's thinking.

What *Personal Influence* revealed is that, in general, personal contacts played a more dominate role than the media in most daily decision-making. Further, and perhaps more importantly, these decisions were not made in an overly simple hypodermic world where A clearly and directly causes B.

The spirit of the "minimal-effects revolution" was well captured in the highly influential text by Joseph Klapper: *The Effects of the Mass Media* (1960). In this review of media research up to that date, Klapper concludes that "mass communication does not ordinarily serve as a necessary or sufficient cause of audience effects, but rather functions through a nexus of mediating factors (Klapper, 1960, p. 8)."

Despite the shifting attitudes in academic circles that occurred in the wake of such studies as *Personal Influence* and *The Effects of the Mass Media,* many people remained convinced that the media had strong, direct, and widespread social effects. McQuail points out that many of the moderate effects doubters were individuals who had a vested interest in the notion of direct and strong media effects. "Those with political motives for using or controlling the media did not feel they could risk accepting the conclusions of researchers (McQuail, 1988, p. 254)."

It was into this climate that television appeared and ushered in what McQuail describes as the third phase of media effects: "powerful media rediscovered."

The relationship between violence on television and violence and crime in society has been the locus for a tremendous amount of media effects research. Considering the kind of social upheaval which America experienced during the 60s it should come as no surprise that many saw the relatively new technology of television as a clear and direct "cause." Consequentially, the government funded two massive studies of the subject.

The first such investigation was part of the work overseen by the Media Task Force of the President's Commission on the Causes and Prevention of Violence, which produced the report *Violence and the Media* (Baker & Ball, 1969). In addition to a thorough review of what was known about the relationship between media violence and actual violence, the study also contained significant original research examining the relationship between the violence portrayed on prime-time television and the reality of violence in America.

What the study found, in extreme brief (the document is over 600 pages), is that television *is* very violent but *does not* paint an accurate portrait of real-world violence. But the Task Force was also interested in addressing the question of causality. Could television-depicted norms of violence cause members of society to adopt those norms? They concluded that "The television world of violence has the capacity to reinforce the 'violents' in their beliefs and actions in the real world (Baker & Ball, 1969, p. 367)."

The Task Force's conclusion that television violence causes real world violence was unfortunately based on inferential conclusions unwarranted by the actual data of the study. Nonetheless, the report had important impacts. It began to counter the pendulum swing against media effects by tossing aside the idea that to *merely reinforce* a social tendency was the equivalent of having no effect at all. Additionally, it began introducing the idea that media effects could be long-term and indirect, yet powerful (Lowery & DeFleur, 1983).

Perhaps the most important outcome of *Violence and the Media* was the interest and further research it sparked in the topic. Following closely on its heels was *Television and Social Behavior* (Comstock & Rubinstein, 1971). The result of a million dollar social science research initiative launched by Congress, this report contained over 40 independent scientific studies, and is often referred to as "The Surgeon General's Report" (the interpretative conclusion was a report to the Surgeon General). The summary report that accompanied this collection of research was not without its political motivations and controversy, however.

It is impossible to summarize adequately a collection of 40 scientific reports. Nonetheless, Lowery and DeFleur offer three conclusions drawn from these investigations:

1. Television content is heavily saturated with violence.

2. Children and adults are spending more and more time exposed to violent content.

3. Overall, the evidence supports the hypothesis that the viewing of violent entertainment increases the likelihood of aggressive behavior. This evidence is derived from both laboratory experiments which permit causal inference, and from surveys which provide evidence of real-life associations in everyday events. (Lowery & DeFleur, 1983, p. 353)

They also point out a major flaw:

> The major problem of the Television and Social Behavior program of research is the way in which the research problem was posed. The Advisory Committee chose to frame the question in terms of direct effects: Does exposure to violence lead children to specific acts of antisocial behavior? As far as the broadcast industry is concerned, this is probably the most acceptable formulation. We must, however, consider the possibility, or probability, that television's most profound influences may be indirect. (Lowery & DeFleur, 1983, p. 354)

Television, with its immediacy and photo-realism, seems almost custom made for strong media effects thinking. However, the search for strong, direct effects — even with million dollar research budgets — could not completely escape the emerging picture of the media

operating in a complex world full of indirect and multi-directional relationships. As researchers began moderating between "no effects" and "hypodermic effects" a new way of thinking began to emerge.

Everett Rogers (1988) dubs this current state of affairs as the moderate effects era. Opinions about the effects of the media are still widely varied and many divergent theories and methods are used for the study of those effects. However, several principles bridge the various camps: even limited or intermediate effects are in themselves a powerful social force; communication effects are transmitted through a variety of channels including interpersonal ones; effects attributable to the mass media cannot be wholly separated from other existing social conditions, structures, and processes.

### 3. The emergence of agenda-setting

It was just prior to this current era of media effects research that political scientist Bernard Cohen made this observation:

> . . . the press is significantly more than a purveyor of information and opinion. It may not be successful much of the time in telling people what to think, but it is stunningly successful in telling its readers what to think *about.* The world will look different to different people, depending . . . on the map that is drawn for them by writers, editors, and publishers of the papers they read. (Cohen, 1963, p. 13)

Cohen's observation represents a prima facie theory of media effects based on general ideas that can be traced back to Walter Lippmann's classic *Public Opinion* (1922). Lippmann painted a picture of a "pseudo-environment" fabricated out of media reports. He argues that it is in this pseudo-environment that people form a basis for their actions in the real world.

> In all these instances we must note particularly one common factor. It is the insertion (by the media) between man and his environment of a pseudo-environment. To that pseudo-environment his behavior is a response. But because it is behavior, the consequences, if

> they are acts, operate not in the pseudo-environment where the behavior is stimulated, but in the real environment where action eventuates. (Lippmann, 1923, p. 15)

As the 1960s drew to a close, the researchers Maxwell McCombs and Donald Shaw began a scientific study which first utilized Lippmann and Cohen's observations as the hypothesis. The result was *The Agenda-Setting Function of the Mass Media* (1972).

The term agenda refers to "issues or events that are viewed at a point in time as ranked in a hierarchy of importance (Rogers and Dearing, 1988, p. 556)." Therefore, agenda-setting was originally conceptualized as the process by which the media transfers its view of the relative importance of issues or events to the audience.

To investigate this idea McCombs and Shaw conducted a study of how the mass media might set the agenda during a political campaign. Their study was based in Chapel Hill, North Carolina, during the 1968 presidential campaign.

A critical aspect of their analysis involved cross-comparisons of the audience's agenda (consisting of undecided voters), the agendas of the political parties, and the media's agenda. The media agenda tended to be a composite of the three campaign platforms, therefore, McCombs and Shaw hypothesized that the agenda of the audience might be more highly correlated with the media's agenda than with any of the three campaign agendas. If this was not the case, it would be likely that audience members were attending selectively to the information (probably along party lines). However, if there was congruence between media and audience agendas, it would be evidence of the agenda-setting power of the media. This is indeed what they found:

> In short, the political world is reproduced imperfectly by individual news media. Yet the evidence in this study that voters tend to share the media's *composite* definition of what is important strongly suggests an agenda-setting function of the mass media. (McCombs & Shaw, 1972, p. 184)

The researchers admit that the strong correlation between the media agenda and the audience agenda does not support causality. However, the nature of the agenda under study suggests that the media is clearly the leading candidate in the role of agenda-setter.

> Interpreting the evidence from this study as indicating mass media influence seems more plausible than alternative explanations. Any argument that the correlations between media and voter emphasis are spurious — that they are simply responding to the same events and not influencing each other one way or the other — assumes that voters have alternative means of observing the day-to-day changes in the political arena. This assumption is not plausible; since few directly participate in presidential election campaigns, and fewer still see presidential candidates in person, the information flowing in interpersonal communication channels is primarily relayed from, and based upon, mass media news coverage. (McCombs & Shaw, 1972, p. 185)

But could it be possible that the media were simply matching their coverage to what they believed to be audience interests? At the time of the study McCombs and Shaw were able to defend this question by pointing out the great dissimilarities in news judgment between journalists and the members of their audience: "It would be remarkable to find a near perfect fit in this one case (p. 185)." Further, five of the nine news media in the study originated from outside the Chapel Hill area.

With this argument, McCombs and Shaw effectively set the frame of the agenda-setting concept. While the matter of directionality would later be questioned, the general idea of agenda-setting caught fire and a new thrust in media effects research was launched (Protess & McCombs, 1991).

The research tradition in agenda-setting since McCombs and Shaw can be divided into three phases. The first phase conceptually follows the original framework: measure the influence the media has in shaping the public's agenda. The second, transitional phase has recognized that the agenda-setting effect may flow in either direction. These studies have

sought to examine the forces at work in shaping the media's agenda. The third, and current, phase invokes the concept of agenda-setting as a social process. Taken together, this flow in thinking is the force behind one of the most important developments in agenda-setting (and perhaps media effects research): the evolution of a systems perspective and the understanding of agenda-setting as a complex social process.

**4. Phase I studies: Media influence on the public's agenda**

Funkhouser (1973) executed an early agenda-setting study which sought to compare news media coverage to public opinion and then compare those two with reality. To do this, he utilized the issues of the 1960s (for example, Vietnam, race relations, environment, crime ... ). While McCombs' and Shaw's study represents agenda-setting on a micro time scale, Funkhouser's eleven-year study examines agenda-setting on the macro time scale.

To obtain a measure of public opinion, Funkhouser drew from the Gallup Poll question regarding "the most important problem facing America." Media coverage was represented by the number of stories per topic appearing in *Time, Newsweek, and U.S. News.* He reasoned that news magazines represent the general content of the major news media. Finally, reality had to be measured. To do this, Funkhouser relied on facts and figures reported in the *Statistical Abstracts of the United States.* For example, trends in the Vietnam war could be inferred by the number of our troops in that country (other admittedly qualitative sources were employed for some categories, such as ecology or student unrest).

Funkhouser found that the rank ordering of the importance of the issues as represented in the media was highly correlated with the rank ordering of the issues in public opinion. However, correlations between reality and either media coverage or public opinion proved to be another matter.

> Peaks in coverage appeared during years in which the situation in these areas was no different from other years, and in several cases coverage increased while the problem was getting worse . . . .(Funkhouser, 1973, p. 533)
>
> The significance of Funkhouser's findings is summed up by Protess and McCombs:
>
> The basic agenda-setting hypothesis asserts that the issues and information presented on the media agenda over time become the issues and information on the public agenda. Of course, the news media do not create these issues out of whole cloth, and some critics of the agenda-setting approach have asserted that real world events, not the news media, set the public agenda. At best, argue these critics, the news media are the mirror that reflects these real world events. Of course . . . Funkhouser's examination of public opinion in the 1960s found that the public agenda and the press agenda showed much greater convergence with each other than either did with indicators of trends in the world outside. (Protess & McCombs, 1991, p. 44)

In another study which was designed to measure the media's influence on the public's perception of "reality," Gordon and Heath (1981) examined newspaper coverage of crime. Three cities with competing newspapers were selected: Chicago, Philadelphia, and San Francisco. The competing papers in those cities were evaluated on their coverage of local crime. Readers were then evaluated on their fear of crime. It was found that the readers who subscribed to the more crime oriented newspaper had a greater fear of crime. This was true despite the fact that readers were distributed throughout the city and should have therefore been exposed to the same "crime reality."

Agenda-setting research has not been limited to studies involving print media. Iyengar, Peters, and Kinder (1982) performed an experiment to test the agenda-setting potential of television.

In this study, the researchers subjected volunteers from New Haven, Connecticut, to an experiment which covered a six day period. Participants first completed a questionnaire which

evaluated a range of political topics. Then, they gathered each day to watch the evening news. However, the broadcast's content was altered to emphasize a particular problem (experiments were run on a variety of topics). Finally, the participants completed a second questionnaire designed to measure the influence of the over-emphasized (altered) "news" material in the experiment.

Individuals who were exposed to the news material which emphasized pollution, for example, subsequently raised their evaluation of the importance of the pollution problem. Individuals in a control group who saw the news unaltered exhibited no such change. The researchers concluded:

> . . . the evidence . . . strongly supports the classical agenda-setting hypothesis. . . . viewers exposed to news devoted to a particular problem become more convinced of its importance. Network news programs seem to possess a powerful capacity to shape the public's agenda. (Iyengar et al., 1982, p. 852)

Taken together, the work of McCombs and Shaw, Funkhouser, Gordon and Heath, and Iyengar, Peters, and Kinder represent a sampling of the many unidirectional studies of the agenda-setting effect. This one-way sender-receiver perspective is the hallmark of the early work in agenda-setting.

### 5. Phase II studies: Transition from the S-R perspective

Most of the some 200 agenda-setting studies to date have centered on the media's role in affecting issue salience in the public's mind. These unidirectional investigations have generally demonstrated that the media do have an ability to at least influence what the public thinks about. However, the authors of agenda-setting did not intend for their concept to limit researchers to the examination of the media-audience relationship. Recently, researchers have been paying attention to other agenda-setting relationships as well and the overall concept of agenda-setting has expanded. (Protess and McCombs, 1991).

The general thrust of these studies is to ask the question: who sets the media's agenda? If the media have the ability to influence the public, as the first phase of the studies suggest, then this is a question of some importance. The following three studies each address a specific force of influence over the media's agenda: the audience, other media, and news sources.

Smith (1987) conducted an agenda-setting study which can be seen as transitional: bridging the first and second phases. Rather than seeking to explicitly measure the impact that media coverage has on public opinion, Smith asked: how does the media *relate* to public opinion? Does media coverage of an issue lead public interest, run concurrently with it, or lag behind? Smith describes how media coverage and public opinion interact to produce both positive and negative feedback loops.

Smith investigated poll information describing public opinion of "the most serious problem" in the Louisville, Kentucky, area. Shifting public opinion was later compared to coverage of the "problems" in the *Louisville Courier-Journal.*

The study found that public concern and newspaper coverage have a mutual influence on each other, and that the time period between action and reaction can vary with the particular issue at hand. Also, this influence can flow in either direction. Newspaper coverage of an issue may promote public concern (the surveillance function of the press), or an increase in public concern may promote newspaper coverage of an issue (perhaps an indication of a marketing reaction).

Smith found that the feedback loops tend to be of two types, amplifying and controlling (sometimes referred to as positive and negative, respectively). An amplification loop causes directional change over time. This kind of relationship should be present as an issue either rises or falls on the agenda. Conversely, control loops serve to stabilize a condition. This effect should occur while an issue is either at a peak, trough, or a leveling out phase in the relationship between media coverage and public opinion.

Relationships which exist between the media themselves also have an impact on the media's agenda. This condition was investigated by Reese and Danielian (1989). Considering the nature of media coverage of issues, they write:

> Big events drive many big stories and draw general attention to the problems they represent. . . . . Other stories are less tied to specific events yet become big nevertheless. In the last couple of years such stories have included the famine in Ethiopia, Mideast terrorism, and the farm crisis. The problems behind these stories existed before the media "found" them and continued to exist after attention waned.
>
> Each of these stories was characterized by a rapid convergence of media attention, during which it seemed that all media channels as well as conversations on the street are filled with the story. Although this bandwagon tendency among the media is not new in the press, one wonders if it has become more pronounced in recent times. (Reese & Danielian, 1989, p. 29)

To address this question Reese and Danielian analyzed media coverage of cocaine during 1985 and 1986. They looked at the nature and amount of coverage in five elite newspapers (*New York Times, Los Angeles Times, Wall Street Journal, Washington Post, and Christian Science Monitor*), *Newsweek* and *Time* magazine, and the three television networks.

They found that media coverage tended to be quite similar in amount and content, with the broadcast media being more alike than the print media. The amount of coverage in 1985 showed a pattern of interrelationships between print and broadcast media. An increase in coverage by the *New York Times* and the news magazines was followed about a month later by an increase in coverage by the networks.

The deaths of Len Bias and Don Rogers, in the summer of 1986, fueled interest in coverage of cocaine in general, especially in New York. Reese and Danielian suggest that this was the flash point:

> These stories were followed by a rush of coverage in other media in the following months, climaxing in the peak of media attention seen in July (of 1986). So although the death of the athletes may be considered prominent events driving each medium's agenda, these events probably had the effect of focusing press attention on an issue already set in motion. (Reese & Danielian, 1989, p. 39)

In their analysis, the researchers state that the *New York Times* began the coverage, then the *Post* joined in with a focus on Len Bias. With those two in motion, the *Los Angeles Times* felt obliged and jumped in as well. In addition, the *New York Times* appeared to set the agenda for the networks. Indeed, Gans (1979) observed that, when it comes to the journalistic decision process, "if the *Times* did not exist, it would probably have to be invented (p. 181)."

Print coverage of cocaine continued at a low level into 1987, well after broadcast attention had moved on to a new topic. Reese and Danielian conclude:

> Television news, more than newspapers, appears to follow a smooth attention curve, discovering an issue, playing it strongly, and then moving on to other stories. This tendency may contribute to the notion that the media converge on issues, resulting in a short national attention span. (Reese & Danielian, 1989, p. 41)

Another study investigating the question of who sets the media's agenda was done by Turk (1986). The purpose of her study was to take a look at the influence exerted on media content by public information offices through the information handouts they provide to journalists.

Turk looked at the influence exerted by the information offices of six state agencies in Louisiana on eight of that state's daily newspapers. She found that just under half of the press releases resulted in stories and that just over half of the information in a typical press release is passed on to publication. She concludes:

> Even though journalists and the conventions of the media for which they work play a role in shaping the media agenda, the sources of the raw material of information upon which

journalists rely may ultimately have as much to do with the media's agenda as the selection processes of the journalists themselves. (Turk, 1986, p. 15)

Gans (1979) echoes the importance of considering the influence of the source in shaping the media agenda:

The relationship between sources and journalists resembles a dance . . . . Although it takes two to tango . . . more often than not, sources do the leading. (p. 116)

These studies, and others like them, evoke a new openness to the issue of directionality in agenda-setting. The willingness of researchers to look beyond the S-R basis of traditional agenda-setting is the factor which is acting to set the stage for what may be the ultimate state of agenda-setting. What is now emerging is a picture of agenda-setting as a holistic social process involving information-effect exchanges between a host of spheres.

### 6. Phase III studies: A systems paradigm

Rogers and Dearing (1988) suggest a three-by-three matrix to summarize the possible areas of agenda-setting research. The nine resulting cells of the matrix are:

Media influence on: the media, the public, policy makers.

Public influence on: the public, the media, policy makers.

Policy makers' influence on: policy, the media, the public.

Most research has concentrated on the media-to-public, media-to-policy, and public-to-policy relationships. They conclude that "Future agenda-setting research should include analysis of the media agenda, in addition to studying policy and public agenda-setting."

Who sets who's agenda? That has been the central question all along and is at the core of each of the nine cells suggested by Rogers and Dearing. Perhaps the difficulty with the theoretical development of agenda-setting has been caused by researchers looking at the very narrowly defined relationships within each of the cells. Agenda-setting relationships are not unidirectional and do not exist in a vacuum. A more holistic approach to agenda-setting may be

necessary for the synthesis of an overall theory to emerge from the considerable mass of empirical investigation.

What may be called for in agenda-setting is a systems approach. This emerging line of thought has been elaborated on by Megwa and Brenner (1988) in their description of agenda-setting as a process.

They promote the idea that it is inaccurate to confer agenda-setting powers to the media alone. The actual agenda-setting process occurs in a complex of multi-directional relationships.

> In other words, there are four distinct agendas in the agenda-setting process: source agenda, media agenda, audience agenda, and policy agenda. And each of the four agendas has its own characteristic patterns, and each is related to the others by one or more informational, behavioral or institutional factors. (Megwa, 1987, p. 183)

They argue that in order to describe agenda-setting effects it is necessary to find the locus of agenda-setting. Who are the agenda-setters? Who sets the agenda of the media? Megwa and Brenner thus seek to expand the domain of agenda-setting and define it as a social process in which policy makers, news sources, media, and audience all play active, simultaneous, and multi-directional roles.

McQuail casts some doubt on the veracity of the original media-to-audience agenda-setting hypothesis but is still able to admit that "It is likely that the media do contribute to the convergence of the . . . agendas . . . (McQuail, 1988, p. 276)" Grudgingly, McQuail seems to agree that, especially for matters of high salience, the media are to a large degree the transactional locus of information exchange in a free and open society. In his criticism, he offers a blueprint for future research into agenda-setting which reflects the systems perspective outlined by Megwa and Brenner:

> For that (meaningful research) we need a combination of: content analysis of party programs; evidence of opinion change over time in a given section of the public (preferably with panel data); a content analysis showing media attention to different

issues in the relevant period; and some indication of relevant media use by the public concerned. (McQuail, 1988, p. 275)

The new conceptual framework being built around agenda-setting by these and other researchers is put to a thorough test by Rogers, Dearing, and Chang (1991) in a study of the agenda-setting relationships surrounding the issue of AIDS in the 1980s. In this holistic examination they strive "toward a broader conception of agenda-setting" and point out:

> Traditional approaches to agenda-setting research, such as natural history models and public arena models, have provided only partial explanations of the total process of public issue development. A broader concept of agenda-setting which considers influences among various agendas while focusing on issue competition, the role of new information about an issue, and changing media interpretations is likely to be more useful in explaining the development of an issue through the agenda-setting process. (Rogers et al., 1991, p. 7)

This impressive study of communication about AIDS considers the interrelationships between the agendas of the media, science, pollsters, and policy makers. It also includes a measure of reality: the rising number of AIDS cases. The researchers constructed a 91-month-long time series for each agenda under consideration and searched for causal relationships.

> We assess the over-time causal relationships among our five time series without a priori assumptions. We take a two-step approach: First, we select each possible pair of time series out of the five, forming 10 bivariate relationships, and test whether causal relationships exist between them; second, we incorporate significant bivariate relationships into a multivariate analysis. (Rogers et al., 1991, p. 26)

The media agenda is a measurement of the number of stories in *The New York Times, The Los Angeles Times, The Washington Post,* and the three television networks. The science agenda is represented by the number of articles on AIDS appearing in four major research journals. The polling agenda is the number of poll questions asked in national polls as indexed

by The Roper Center (a total of over 1,084 questions in 110 polls by 35 organizations). The policy agenda is represented by the amount of federal funds allocated for research, education, and testing. The unit of analysis is the month.

Their findings illuminate a variety of relationships and forces.

**New information.** They point out that many issues go through cycles of media attention as new information about the issue remakes the issue as newsworthy. Issues which rise in salience only to eventually trail off and disappear do so, to some degree, simply because there is nothing new to report. The researchers found that AIDS has been an issue which has remained high in salience because it is being continually redefined by new information. However, they observed that any given sub-issue (e.g. mandatory testing) did go through a characteristic rise and fall of salience.

There were three events which served to remake and rejuvenate media coverage of AIDS during the period of the study. The first event was an editorial by the *Journal of the American Medical Association* suggesting that AIDS could be transmitted through "routine household contact." The second event was the combined effect of the deaths of Rock Hudson and Ryan White. The third event was the advent of the debate over mandatory testing.

Through their analysis of the nature of the information behind the story counts the researchers were able to use these three events to statistically divide AIDS coverage into distinct and significant eras: the science era, the human era, and the political era.

**Inter-media agenda-setting.** The role of the elite media in influencing coverage by all media has been often observed, and is replicated in this study. Once again, *The New York Times* is viewed as the leader of the pack. The researchers observed that *The Times'* coverage was slow to get off the ground and that this had the effect of thwarting early media attention of AIDS. *The Times* did not play an important role in leading media coverage until nearly six years into the epidemic.

They point to organizational factors behind *The Times'* behavior:

> A former editor of *The New York Times* felt that news stories about gays were not appropriate for his newspaper. For five years into the AIDS epidemic, *The Times* refused to use the word "gay" except within quoted passages. Reporters may have felt that their news stories about a gay-related issue like AIDS would be unlikely to appear on the front page. (Rogers et al., 1991, p. 11)

**Agenda interaction and causal relationships.** Impressive zero-order correlations were found among the various agendas, ranging from .32 for policy-polling to .88 for policy-number of AIDS cases (all significant at $p < .05$).

Out of the ten possible bivariate relationships four were found to have one-way causality through the application of Granger Analysis (introduced to agenda-setting by Smith, 1987). The four were: science explains media; number of AIDS cases explains media; science explains polling; policy explains polling. There is also a reciprocal relationship between media and polling that "suggests that media organizations sponsored polls that asked questions about AIDS and then created news stories (often several-part series) based on the poll results." Additionally, it was found that the number of AIDS cases had little influence on the other four agendas and that the media agenda did not influence the policy agenda (contrary to some earlier research with other issues).

The researchers determined that these bivariate relationships contain two common dependent series that could be used to construct multivariate models to predict the media agenda and the polling agenda as dependent variables.

The most important result of Rogers et al. is not contained in their statistics: it is the form of the study itself. Their approach represents the result of 20 years of evolution in agenda-setting research. This type of study may very well be the future of agenda-setting. While it may be said that "the great studies remain to be done (Lowery & DeFleur, 1983, p. 381)," it at least appears that methodological momentum exists.

## 7. Contingent conditions of the agenda-setting effect

As researchers were demonstrating that the rules of indirect and multi-directional effects applied to agenda-setting, others were laboring to find the operational boundaries of the agenda-setting model: when does it function best?

This question is intimately tied to the dynamic nature of public opinion itself. There are many public opinion models which feature distinct, identifiable stages of opinion formulation, as would be called for in agenda-setting research (Bryce, 1888; Foote & Hart, 1953; Davidson, 1958; Nimmo, 1978; VanLeuven & Slater, 1991). One, however, fits very nicely within the parameters of the agenda-setting model and is worth examining within the context of understanding when agenda-setting is likely to be operative and when it is not.

Downs (1972) offers an insightful model of public opinion in his discussion of the rise and fall of issue salience, the "issue-attention cycle."[2] Downs examined the waxing and waning of public attention to ecology and states:

> American public attention rarely remains sharply focused upon any one domestic issue for very long – even if it involves a continuing problem of crucial importance to society. Instead, a systematic "issue-attention cycle" seems strongly to influence public attitudes and behavior concerning most key domestic problems. Each of these problems suddenly leaps into prominence, remains there for a short time, and then – though still largely unresolved – gradually fades from the center of public attention. (Downs, 1972, p. 38)

Downs provides a description of the dynamics of the "issue-attention cycle." Issues go through five distinct phases.

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[2]It is interesting to note that Downs' model has been often cited as a potential operative force in a number of media-opinion studies. However, to date, the literature reveals few studies attempting to operationalize and demonstrate the "issue-attention cycle." One such study is Peters and Hogwood (1985). Other authors citing Downs include: Anderson (1991), Dearing (1989), Salwen (1988), Protess, et al. (1987), Protess, et al. (1985), Atwater, et al. (1985), Schoenfeld (1980).

**1. Pre-problem.** "This prevails when some highly undesirable social condition exists but has not yet captured much public attention, even though some experts or interest groups may already be alarmed by it."

**2. Alarmed discovery, euphoric enthusiasm.** "As a result of some dramatic series of events, the public suddenly becomes both aware of and alarmed about the evils of a particular problem." This is followed by a reaction of overconfidence in society's ability to discover a solution. This "euphoric enthusiasm" is often propagated by political leaders.

**3. Realizing the cost.** "A gradually spreading realization that the cost of solving the problem is very high indeed." The public also realizes that the problem is being caused by a condition which is providing benefits to a large part of society.

**4. Gradual decline of interest.** Three reactions occur. Some people become discouraged. Some suppress attention out of fear. Others simply get bored. Often, all three reactions operate to varying degrees. Meanwhile, another issue may be on the rise.

**5. Post-problem.** "A prolonged limbo — a twilight realm of lesser attention or spasmodic recurrence of interest."

Given an awareness of the dynamics of public opinion and a faith in the general premise of the agenda-setting model, researchers have sought to understand the various contingent conditions under which agenda-setting operates. Researchers have examined a wide variety of these conditions, including the duration of media attention, channel effects, the nature of issues, and so forth. The following is an overview of some of the more significant findings.

**Psychological state of the individual.** McCombs (1976) reviewed the early agenda-setting literature and set forth a set of conditions specific to the individual which might facilitate or retard the agenda-setting effect. These conditions include the individual's need for orientation, level of engagement in interpersonal communication, degree of exposure to the media, and decision state regarding the issue at hand (decided versus undecided).

In summary, individuals with a strong need for orientation, low levels of interpersonal communication, a high degree of media exposure, and an undecided decision state are most likely to be subject to the agenda-setting effect.

**Obtrusiveness of the issue.** A number of researchers beginning with Zucker (1978) and including Eyal (1980), Winter, et al. (1980), and Blood (1982) have found that an issue's obtrusiveness affects its likelihood of being impacted by the agenda-setting phenomenon. Obtrusive issues, ones experienced directly in the lives of individuals (e.g. unemployment), are far less likely to be affected by agenda-setting. However, those issues with which the audience has no direct experience are highly influenced by agenda-setting. Eyal cites the Iranian hostage situation as an example: very strong opinions were formed in the absence of any significant personal contact with the situation.

Blood has offered a refinement of the obtrusiveness concept. He points out that issues cannot be subjected to "researcher-designated dichotomies." Rather, issues must be placed on a continuum in regard to their obtrusiveness and this continuum may vary with the individual and with the specific issue. For some, unemployment is highly obtrusive, for others it is less so.

**National versus local issues.** Palmgreen and Clarke (1977) found that agenda-setting is more likely to occur with national, rather than local, issues. The researchers performed a content analysis of newspaper and television coverage in Toledo, Ohio, and determined the ranking of local and national issues as represented in those media. They then conducted a two part random survey of the residents of Toledo. Part one of the survey tested for the audience's agenda regarding local issues, part two tested for national issues.

They determined that "the media play very different agenda-setting roles depending on whether the issues under study are of local or of national political origin. . . . the agenda-setting impact of the media . . . is generally weaker at the local level (Palmgreen & Clarke, 1977, p. 449)."

Researchers consider this condition to be driven by a combination of high issue obtrusiveness and high levels of interpersonal communication regarding local issues as compared to national issues.

**Duration of media attention.** Winter and Eyal (1981) determined that the duration of time over which the media cover a topic influences that topic's placement on the public's agenda. They compared *New York Times'* coverage of civil rights issues with public opinion polls on that topic. They found that recent media attention (in the case of this issue, four to six weeks) had a much greater agenda-setting effect than cumulative media attention.

The researchers point out that the actual time lag will probably be specific to a particular issue. Nonetheless, the study suggests a peak agenda-setting time frame followed by a diminishing effect over time.

**Print—Broadcast synergy.** Schoenbach (1991) found that television tends to "spotlight" issues which are being covered more thoroughly in the print media. Rather than comparing "top seven" lists of important issues in the media to similar lists from the audience, Schoenbach compared each individual's "important issue list" to that individual's amount of media use. The same group of subjects were sampled repeatedly over a period of time spanning European Community parliamentary elections in West Germany: a time when a number of issues were being hotly debated.

For any of the 19 issues in the study, a half to a quarter of the respondents changed their minds about the importance of that particular issue: they reordered their lists. Schoenbach found that "the frequency with which respondents had read something about the European elections in news magazines and seen election coverage on TV news, shows the most significant effects on the intrapersonal agenda (Schoenbach, 1991, p. 129)." Those subjects with high levels of media use were more likely to change their minds about the relative significance of issues.

By examining which media were being used and when, Schoenbach's study indicated that print media, with their greater capacity for information, influence individual agendas early on. However, he also found that television coverage can have the effect of intensifying those agendas, making them less likely to change later on (assuming a similarity in the print and television agendas).

**Educational level of the audience.** Hill (1985) examined a variety of audience attributes as they related to agenda-setting by television news. He found that individuals with higher levels of education (and therefore a greater "news awareness") are more susceptible to the agenda-setting effects of television news. Because increased print media exposure was also correlated with higher levels of education, Hill also inferred that print media lay the groundwork for the effects of broadcast.

**The technical nature of the issue.** Mazur (1981) investigated the relationship between the nature of public opinion and the amount of media coverage during instances where a technical issue is involved in controversy. In particular, he examined fluoridation of public water supplies from 1950 to 1973 and nuclear power plants from 1960 to 1980.

Mazur sums up his findings:

> The rise in reaction against a scientific technology appears to coincide with a rise in *quantity* of media coverage, suggesting that media attention tends to elicit a conservative public bias. (Mazur, 1981, p. 106)

His findings were especially dramatic concerning the accident at Three Mile Island. Mazur examined coverage in the *New York Times, Time* and *Newsweek* magazines, and the three network news programs from March 1979 to January 1980. The Harris Poll organization was commissioned by the nuclear industry to conduct monthly polls for this entire period, therefore Mazur's data are quite fine grained.

It was not surprising to find that the leap in coverage immediately following the accident caused a corresponding dip in public approval of nuclear energy. What was surprising,

though, was the rapid rebound of public opinion coinciding with the reduction of media coverage. The effect was again demonstrated near the end of the year when media attention rose modestly in response to the release of the report of the investigating committee. Again, opinion dipped and rebounded in strong relation to the rise and fall in media attention.

Mazur concludes that "This evidence suggests that the media play an active role in shaping and even constructing controversy rather than simply reporting it (Mazur, 1981, p. 106)."

**Controversy.** In a pioneering effort to approach the issue of *why* in the agenda-setting process, Weiss (1992) takes the position that ". . . the agenda-setting concept, if limited to controversial issues, would gain significance (p. 378)." He goes on to develop an approach, argumentation analysis, which measures the "stereotyping of issue-specific conflicts by journalists and the news media (p. 374)."

Weiss concludes that the media tend to focus the debate over an issue on a few arguments. The media also tend to polarize the controversy over an issue. It is through these mechanisms of stereotyping that the media transmit an agenda to the public. By measuring the specific nature of an issue's stereotyping in the media Weiss suggests that it is possible to find that stereotype reflected in the public mind.

A key point in Weiss' argument, closely related to Mazur's, is that many of the agenda-setting studies which have found strong effects have utilized controversial issues.

## 8. Criticism of agenda-setting research

Agenda-setting research has been abundant since its formulation twenty years ago. Rogers and Dearing suggest this is because "agenda-setting research appeared to offer an alternative approach to the scholarly search for direct media effects, which had seldom been found in mass communication research (Rogers & Dearing, 1988, p. 565)."

As agenda-setting research has grown it has drawn considerable criticism. On a fundamental level, agenda-setting is viewed by its critics as just another attempt to resuscitate the search for strong media effects (Swanson, 1988). Further, some in this camp also consider any agenda-setting effect to be trivial: only able to influence awareness, not actual media content or individual understanding.

Agenda-setting's lack of theoretical framework is the focus of much criticism:

> Although research on agenda-setting has proliferated over the last decade, so far, unfortunately, the results add up to rather little. With a few important exceptions, agenda-setting research has been theoretically naive, methodologically primitive, both confused and confusing . . . . Agenda-setting may be an apt metaphor, but it is no theory. (Iyengar & Kinder, 1987, p. 3)

McCombs also points out that "The dearth of replication in the research literature leaves many explanations for the variations in the empirical findings (McCombs, 1981, p. 122)."

The scattered nature of agenda-setting research is addressed by Rogers and Dearing (1988). They observe that researchers in agenda-setting have concentrated more on empirical testing than on theory building. Improvements have been made in the methods of measuring various agendas, understanding the effects of time, and in developing statistical techniques. However, the results of these studies have not been synthesized into a generalized theory of agenda-setting. Especially missing is any sort of bridge between the bodies of literature on public agenda-setting and policy agenda-setting (also referred to as agenda-building).

McQuail concludes that:

> Most evidence is inconclusive and assessments tend to leave agenda-setting with the status of a plausible but unproven idea. The doubts stem not only from the strict methodological demands, but also from theoretical ambiguities. (McQuail, 1988, p. 276)

Becker (1991) effectively reduces agenda-setting's most substantial problem to a succinct package: ". . . the theoretical rationale for linking media content with public opinion has been

poorly developed. Often it is simply not present at all (p. 343)." This is agenda-setting's most serious deficit, its failure to address *why*.

## 9. Discussion: The future of agenda-setting

In considering the future of agenda-setting, it is impossible to ignore the rapidly evolving aspects of mass communication. All of the studies so far completed on the agenda-setting function of the media — over 200 of them by some counts — have examined the traditional media outlets of print and broadcast: major newspapers, magazines, and networks. But this world, dominated by a select few media heavyweights, is rapidly crumbling.

In a recent political commentary in *Time* magazine, Jonathan Alter (1992) observes that the rules of the agenda-setting game are being rapidly rewritten. He notes that former presidential candidate Ross Perot declared that it no longer matters what the *New York Times* has to say. In the final analysis, about one in five voting Americans agreed. Alter offers his thoughts:

> The system is splitting in two. There's Old Media: the nets, big newspapers and news magazines, Washington-based op-ed chin-pullers, public TV and influential journals of political opinion. Then there's New Media: CNN, C-Span, infotainment talk shows like "Larry King Live" and "Donahue," computer bulletin boards and satellite hookups. Old Media is far from dead, especially in agenda-setting . . . . But it's now possible to go over the heads of the old players as never before. (Alter, 1992, p. 28)

This condition was certainly demonstrated during the 1992 presidential campaign. But what effects will linger? Alter concludes that the "New Media is less elitist and more democratic, which is good. But it's less analytical, which isn't (Alter, 1992, p. 28)." It seems unlikely that the technique of bypassing the traditional, more analytical, news channels will be abandoned after so dramatic a demonstration as the 1992 campaign.

In the not-so-distant past there were but three television channels. This is no longer the case. According to Webster (1989) this proliferation of channels is having the effect of both fragmenting and polarizing society. Audiences fragment into their respective special interests and polarize away from information and points of view not seen as acceptable or correct.

He points out that this change in the audience will have a significant impact on the ways in which researchers and practitioners alike can view the relationships between media and society:

> The audience's response to the new media raises questions about theories that blindly assume television is a uniform presence in the lives of all people. Not only are the new media themselves more diverse, but individual audience members seem to exploit that diversity to create increasingly unique media environments for themselves. (Webster, 1989, p. 211)

Clearly, any message sent through the mass media becomes part of a much greater whole and is subject to a wide variety of forces. However, these forces, relationships and conditions are not static. New information technologies are fundamentally reshaping the information environment, and rewriting the rules for agenda-setting.

How will all this affect the agenda-setting relationships in society? Will agenda-setting be enhanced because sources and policy makers will be better able to target select components of the audience? Or will agenda-setting be negated because the audience has become so scattered and isolated that there is no longer a consensus of attention? Will economic forces transform the media into glorified pollsters? Will they abandon their traditional fourth estate role in exchange for a better market share? These are important questions.

The only realistic way to approach these questions is to examine the full range of agenda-setting effects caused by multi-directional information exchange throughout the social matrix. In a way, agenda-setting research is being shaped for that task by the new information environment itself. As computerization makes the various records of human communication

and behavior increasingly accessible, researchers acquire the means to more realistically evaluate complex social relationships.

What form will agenda-setting assume as this evolution continues? A synergistic reaction is taking place as the various unidirectional approaches to agenda-setting are integrated into a whole: the true shape of the elephant emerges from the many descriptions of its parts. As a result, even the term itself, agenda-setting, has become inadequate. An appropriate semantic proposition might be *agenda dynamics.*

The 1991 study of the issue of AIDS by Rogers, Dearing, and Chang offers the best illustration of this new idea. In their monograph, the authors also conclude that the term agenda-setting is insufficient and propose that what they have completed is an "agenda study."

How might agenda dynamics be conceptualized? To justify such a development some rationale must exist for expanding traditional agenda-setting approaches to examine multiple relationships. Becker argues that the expansion of agenda-setting into something like agenda studies or agenda dynamics is foolhardy:

> The conceptual imprecision and ambiguity of theoretical rationale already plaguing the work on agenda-setting is unlikely to be aided by expansion. What is needed is more attention to the narrow picture. The general picture will emerge at a later time. (Becker, 1991, p. 345)

However, perhaps a valid reason for this expansion can be found in the idea that it may not be possible to capture the essence of what's going on with simple bivariate models. Not only is the whole greater than the sum of its parts, but the parts do not in themselves make full sense outside of the whole. Understanding the behavior of issues in society may require that the general picture take precedence.

Becker's points are not that easily dismissed, though. What may be called for is both a modification of and a splitting-off from the agenda-setting tradition. Perhaps one set of

researchers should take Becker's advice and pursue the narrow picture while another set takes a shot at the grand scheme.

What is the grand scheme? Agenda dynamics should be conceptualized as the temporal modeling of a social issue through the capture of as many of that issue's component social relationships as possible. In essence, it is the development of a methodological framework which can assimilate a wide variety of agenda-setting measurements into a single model. Definitions of terms such as agenda and approaches to units of observation might be varied to best suit each specific relationship within a model.

Further, as Swanson (1988) points out, "if we wish to understand fully how the media influences the public's views or the actions of policy makers, then we must go beyond agendas and consider the content of persons' opinions and of news stories (p. 613)." Researchers such as Weiss are beginning to respond to this need as they develop approaches to content analysis that are appropriate to the task of evaluating agenda-setting influences. A consideration of content will need to be integrated into any holistic appraisal of a social issue.

Unfortunately, such far-flung pursuits might amount to nothing but dust bowl empiricism if the current theoretical state of affairs in agenda-setting is not advanced alongside the methodology. If the big picture cannot be explicated in a theoretical sense then the most wonderful of models is useless.

A number of critical reviews of agenda-setting, most notably Swanson's (1988), urge researchers to begin drawing from work outside of agenda-setting in order to get about the most important task of theory building. Such an effort must be central to the purpose of any further development such as agenda dynamics.

The *sociology* of agenda dynamics must be considered. There are well-worn social science theories which may offer hope. For example, Miller (1992) uses such an approach in a qualitative investigation of the communication relationships surrounding the emergence of cigarette smoking as a social problem circa 1953. Characterizing Miller's monograph as an

agenda-setting study is not quite accurate. However, her topic is similar to one which an agenda-setting study might approach and may in fact be just the sort of work that needs to be examined to further the development of agenda-setting or agenda dynamics.

She investigates a controversial issue in the light of social problems theory and the construction of social problems. An excerpt from Miller's review will serve as an illustration:

> Blumer (1971) argued that social problems go through specific steps before reaching institutionalization: emergence, legitimization, mobilization, creation of an official plan of action, and empirical implementation. Emergence is "recognition" by some group of an issue seen as problematic. "After gaining initial recognition," Blumer wrote, "a social problem must acquire social endorsement if it is to be taken seriously." Legitimization is a selective process whereby some issues are choked off, ignored, avoided and others are given respectability, not necessarily based on merely, Blumer says, "the intrinsic gravity of the social problem." Once legitimacy is established, a problem may become institutionalized, signaling a society has accepted a definition of an issue as problematic, requiring public attention and institutional policy changes, but a social problem may fall by the wayside at any of these steps. (Miller, 1992, p. 2)

Within this theoretical context, Miller describes how public relations and advertising affected press coverage and public perception of the dangers of cigarette smoking. It's not a terrific stretch to imagine such a study with a title more familiar to the agenda-setting literature: Turk, J. V. (1986) *Public relations' influence on the news.* However, the agenda-setting literature has been unfortunately lacking in such perspectives.[3]

This situation should not be allowed to continue. The first step in the development of anything like agenda dynamics should be a thorough search of the various disciplines of

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[3] In fairness to Turk, it should be noted that the purpose of her study did not include any consideration of the formation of public opinion. Further, she does tentatively frame her introduction in terms of the social construction of reality — an idea with linkage to Blumer's symbolic interactionism which is used for this illustration.

sociology for appropriate theoretical foundations. They do exist. And they do harbor answers to the questions behind the correlations and regression equations of the many agenda-setting studies. Why should there be a relationship between media attention and public opinion? What are the social mechanisms at play during the apparent lag between media and opinion? The effort to frame these and other questions will be worth it because, as Swanson (1988) concludes, "these are the sorts of questions that remind us of why mass communication is worth studying (p. 601)."

## B. The Statement of the Problem

As stated in the introduction, this thesis strives to utilize the findings of past research in agenda-setting to maximize the probability of observing the agenda-setting effect. The issue of global warming should exhibit the agenda-setting effect because it is a national/international issue (Palmgreen & Clark, 1977), an unobtrusive issue (Eyal, 1980; Zucker, 1978; Winter et al., 1980; Blood, 1982), a technical issue (Mazur, 1981), and a controversial issue (Weiss, 1992).

The methodological approach of this study is expected to detect the agenda-setting effect because both print and broadcast media are being evaluated (Schoenbach, 1991), a longitudinal design is being used (McCombs, 1981), a single issue is being evaluated (McCombs, 1981; Rogers & Dearing, 1988), and a systems perspective is being employed (Smith, 1987; Dearing et al., 1991).

Given the utilization of the above findings, the statement of the problem for this study is represented by a single overarching research question. Is there a relationship between media attention to the issue of global warming and the level of the public's concern over that issue? Was there an effect?

This research question may be broken down into a set of three related hypotheses that take into account all of the possible conditions for detecting such an effect. This set of hypotheses will be evaluated against eight relationships from a two by four factorial combination. Two measures of public concern are matched with three forms of news media and a combined index of the news media. The results will be discussed in terms of these three hypotheses.

**Hypothesis 1:** Media coverage influences public concern. A significant correlation between the amount of media coverage and the public's concern about global warming exists when media coverage is observed at a time lag previous to public concern .

**Hypothesis 2:** Public concern influences media coverage. A significant correlation between the amount of media coverage and the public's concern about global warming exists when public concern is observed at a time lag previous to media coverage.

**Hypothesis 3:** Public concern and media coverage mutually influence one another. A significant correlation between the amount of media coverage and the public's concern about global warming exists when both media coverage and public concern are observed across a range of opposing time lags.

# III. METHODS

## A. Units of Analysis and Observation

This study uses a time series approach. The primary assumption of a time series is that it utilizes interval level data separated by consistent units of time (McCleary & Hay, 1980). One month units are used beginning with August 1988, and ending with May 1992.[4] This provides a 46 unit time series. This is sufficient to allow for at least 40 observations in the most extreme case of observational lag utilized by this study (discussed below).

Units of observation include public opinion and the three primary types of national news media: newspapers, news magazines, and network television news shows.

Public opinion data are gathered from two sources. The *American Public Opinion Index* was searched under the headings of global warming, greenhouse effect, and any indicated cross-reference such as environment or weather. Copies of the opinion polls were then retrieved from the *American Public Opinion Data* microfiche set.

Additional polls were obtained from the Roper Center for Public Opinion Research. Roper researchers were instructed to search for material under the same headings as used above.

Selecting a set of newspapers to represent the national media is always a somewhat debatable matter. This study follows the lead of Reese and Danielian (1989) in selecting *The New York Times, The Washington Post, The Los Angeles Times, The Christian Science Monitor,* and *The Wall Street Journal.*

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[4] This is the time frame for the correlational analysis of this study. These dates are dictated by the availability of opinion poll data. The data set on media coverage extends back to January 1987.

Further support for this selection comes from a qualitative review which seeks to define the world's 20 most important newspapers. Merrill (1990) states:

> In the vast global wasteland of crass and mass journalistic mediocrity is a small coterie of serious and thoughtful internationally oriented newspapers that offers a select group of readers an in-depth, rational alternative. . . . They are well-informed, articulate papers that thoughtful people the world over take seriously. (p. 93)

Merrill cites the five papers above plus *The Miami Herald* as the best in the United States (in no assigned order).

Two other factors support this selection. Each of the five papers selected is generating its own coverage of the issue at hand through the employment of its own science writers. Therefore, each story selected from these newspapers is original and unique. Many of these stories go on to live a second life in other papers across the nation via the Associated Press. Finally, this set of five newspapers is represented in a single consistent reference index: the *National Newspaper Index.*

Only news stories are used in this study. News stories are defined broadly: any content containing references to global warming or the greenhouse effect, excluding editorials, opinion columns, letters to the editor and advertisements. Book reviews are included. The selection of stories was done using the computerized version of the National Newspaper Index supplied by Infotrac. Because stories are assigned the subject headings of both global warming and greenhouse effect the researcher must be careful to instruct the computer appropriately.

Using the Powertrac feature to execute a keyword search, the following command sequence is used: R1 = greenhouse effect not (letter, column, editorial); R2 = global warming not (letter, column, editorial); R3 = R1 or R2. The final search may be sorted by publication to aid in the retrieval of the papers. Photocopies of the stories are then obtained from microfilm. A 75 per cent reduction allows a broadsheet page to fit on an 11 X 17 inch sheet. The type remains readable.

The Infotrac computer only indexes the most recent four years of the *National Newspaper Index.* Earlier data must be taken manually from the microfiche version of the *National Newspaper Index* (this would be the source for all data if the Infotrac system is not available). The researcher must be careful to check all possible subject headings and follow all indicated cross-references in order to obtain a complete listing from the microfiche set.

Because this study utilized data from both the Infotrac computer and the microfiche versions of the *National Newspaper Index*, a check of one year of data was performed to evaluate consistency between the two approaches. A manual search of the microfiche set for 1989 yielded a perfect match with the Infotrac search for that year.[5]

Three primary news magazines exist in the United States: *Time, Newsweek,* and *U.S. News & World Report.* Funkhouser (1973) similarly used this set of publications to index media attention in an agenda-setting study. A complete listing of stories from these magazines is gathered using the *Readers Guide to Periodical Literature.* Again, both global warming and greenhouse effect must be searched. Consistently sized reproductions must be obtained from microfilm.

While it must be acknowledged that CNN is playing a significant role in defining the shape of television news, for the purpose of this study television will be limited to the three national network news shows. This has been a typical approach in past agenda-setting studies (Reese & Danielian, 1989; Palmgreen & Clarke 1977).

To access this information, *Television News Index and Abstracts* was consulted. This index, published by the Vanderbilt Television News Archives of Vanderbilt University, provides all of the data necessary for this analysis. All items pertaining to the greenhouse effect or global warming are indexed under the heading atmosphere.

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5 Actually, Infotrac will also summon a small number of articles which include the word effect that were written for *The New York Times* by Linda Greenhouse.

## B. Measurements and Procedures

Most agenda-setting studies have used a simple story-count approach to measuring media attention. Frequently these counts are divided into categories and ranked to establish the media's agenda. This study defines the media's agenda as a variable amount of attention given to a specific topic across time. It is therefore desirable to use a more responsive measure of media attention than the story count.

The agenda-setting literature offers little in the way of guidance for the researcher seeking to take weighted measures of media coverage. Salwen (1988) utilizes a weighted measure of newspaper column inches in an agenda-setting study of a single issue. His formula gives higher values to stories closer to the front page.[6] He bases his decision to use weighted measurement on the observation that " . . . media priorities of news topics are often exhibited through prominence of story treatment and display . . . (p. 103)."

This study uses simple weighting strategies to capture a more refined measurement of media attention. The factors which go into creating a weighted measure are specific to the medium. Further, they are based on manifest content of the stories so that intercoder reliability is not an issue. The procedure for each measurement follows.

### 1. Newspapers

Each of the five newspapers utilized in this study have a limited number of column formats.[7] In order to make a consistent measurement across the various papers, each column configuration was converted to a standard. The six column format of *The New York Times* is

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[6] Salwen's formula: $\frac{Np - (P - 1)}{Np} \times CI$

Where: Np = Number of pages in front section CI = Column inches P = Page of story

[7] Style varies a great deal, however, in regard to headline display and the use of art. For this reason, headlines and artwork are not being taken into account.

used as the basis for the standard column inch. Therefore, every other format was assigned a conversion factor to unify all story lengths. That conversion factor is applied to the story length reported in the *National Newspaper Index.*[8]

For example, if the average inch of *The New York Times'* six column format copy contains 100 words, a 1000 word story is 10 inches long. Another format that has 125 words per inch would have a conversion factor of 125/100 = 1.25. In the 125 words per inch format, an 8 inch story contains 1000 words. The conversion factor of 1.25 applied to 8 inches yields a weighted measurement of 10 inches and the two dissimilar formats are reconciled.

These reconciled inch measurements are then assigned a weighting factor to account for the prominence of their display: front page stories are multiplied by four; stories inside the first section are multiplied by three; stories on the front of any inside section are multiplied by 2; stories inside any interior section are multiplied by one.

Generally, these measures apply smoothly to the collection of stories. A few caveats are required, however. In *The New York Times,* a "section front" is sometimes placed on an inside page. For example, the "Business Day" section may begin on page L37. This condition is identified when the inside page displays a section nameplate. When this is the case, the story is given section front weight. Some editions of *The Christian Science Monitor* have only one section. When this is the case, page 20 is considered to be the break between the front section and the inside section.

Although there was only one instance where this occurred, stories appearing in Sunday magazines are assigned as though they are in the A section. Finally, a very small number of stories were included in the collection which did not pertain to the topic at hand. Many of these items were about the ozone hole or an economic summit and made only passing reference to global warming at or near the end of the story.

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[8] It is necessary to obtain copies of the newspapers to establish the column widths and words/inch factors. The lengths reported in the *National Newspaper Index* do not take the column width into account.

If such a story is in question, two rules governed. The story must contain at least two references to global warming and the first one must appear in the first half of the story. Stories in question which failed this test were eliminated from the analysis.

**2. Magazines**

Column inch measurement for the magazines is unified in the same manner as the newspapers. However, the magazines present much less variation in their treatment of body type. All column widths are converted to equal the three column format in *U.S. News & World Report* (40 words per inch).

Magazines do not represent a clear hierarchy of prominence in the same way that newspapers do, the primary exception being the cover. This is due to the more rigid topical departmentalization of magazines. Therefore, magazine story lengths are not multiplied by a positional factor.

Magazines do, however, make more use of art and headline treatment as a percentage of display area. Therefore, the column inch measurement of the magazines includes both headline display and art. Further, if a story is featured on the cover, one additional page worth of copy is counted. No other adjustment is made. These measurements must be made manually.

**3. Television**

Three elements go into the measurement of the television coverage: duration, position, and exclusivity of topic. All three may be directly observed from *Television News Index and Abstracts*. The three are multiplied together.

Duration is the length in decimal minutes of the news segment. This number is multiplied by a positional factor according to where in the half-hour broadcast the news segment begins: multiply by three for the first third, by two for the second third, by one for the last third.

It was observed that a significant subset of the television segments combined two or more related topics into one report. This condition has to be taken into account, since a one minute story mentioning global warming at the end does not equate to a one minute story exclusively about global warming.

This differentiation is based on the heading in the abstract. Stories that have headings that list greenhouse effect as the exclusive or primary topic are assigned a weight of two. If greenhouse effect is among several topics listed in the heading, the story is assigned a weight of one. A few stories appear that do not list global warming in the heading but which briefly refer to it in the abstract text. These measures are reduced by one-half.[9]

For example, the heading DROUGHT / FOOD PRICES that had a mention of global warming would be multiplied by .5 while a heading that says ENVT. / GREENHOUSE EFFECT would be multiplied by 2. A heading like DROUGHT / OCEAN TEMPERATURES / GREENHOUSE EFFECT falls in the 1 category.

**4. Media index**

The analysis will examine each individual news medium as well as the three in concert. It is therefore necessary to combine the newspaper, magazine, and television measurements in some appropriate manner.

No sound basis is at hand to suggest that television should influence such an index a certain amount more than newspapers, etc. Therefore, a method is used to give each an equal impact on the index. Simply adding the three together doesn't work since the units of measurement and weighting factors are not uniform.

To resolve these issues, standardized scores were created for each measure. These scores are then summed together. To remove negative numbers, each summed set of Z scores is then

[9] For example, a February 8, 1989, ABC News "American Agenda" segment is about the environment and features the issue of the Arctic National Wildlife Refuge in Alaska. The only link to global warming comes at the end where a source comments that "oil drilling and global warming are incompatible."

increased by ten to yield each month's media index score. By comparing the results using this index against the results of the individual media alone, it will be possible to see if the three media taken in concert exert some force greater than their sum.

### 5. Public opinion

When it comes to opinion polls as a time series, working with existing data requires some flexibility. Rare is the case where the same polling organization has asked the same question of the same sample type with uniform spacing through time. Gallup's "most important problem" question is one such rarity which has been used in agenda-setting research.

Creativity is a hallmark of agenda-setting research. It is in that spirit that the *concern index* is put forward. To compile this index, 43 separate poll questions were eventually selected. It is necessary to unify these various polls into some appropriate and uniform time series. This secondary analysis of the survey questions creates the concern index. [10]

To be included, poll questions must meet three criteria. First, the question must primarily address global warming. For the majority of the poll questions, global warming is the exclusive topic. However, for example, questions may be included which address global warming in conjunction with air pollution in general. Also, questions might be included which address global warming in the context of national security or the economy.

Second, the question must in some way tap the degree to which the respondent is concerned about the issue of global warming. There is some latitude in this matter. A question might ask: how much attention are you paying to news reports about global warming; how much of a problem do you think global warming will be for your children; are you willing to pay more taxes to control global warming; are you willing to accept the risk of nuclear power to reduce the threat of global warming; or simply, how concerned are you about global warming?

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[10] The appendix contains a compendium of the survey questions contained in the concern index. It also reports an intercoder reliability test for the construction of the concern index and an elaboration of the criteria for question inclusion.

Third, the question must allow either a yes/no response or a scaled response ranging in some fashion from not concerned to extremely concerned.

Several months have more than one poll in them. When this is the case, they are averaged. For a few of the months the specific question of interest was asked: How concerned are you about the greenhouse effect? When a month contains this question, other less direct questions are not considered. There are a number of months which do not contain appropriate opinion polls. In order to meet the assumption of a time series, these missing cases were filled in by simple interpolation (see appendix).

The vast majority of the poll questions utilized are national samples executed as telephone surveys. However, in order to make the time series as complete as possible, state or regional surveys have also been included. This amounted to a total of 8 such surveys, only five of which were not averaged with national surveys to arrive at the month's value.

The nature of the poll questions on this topic suggests that there are two ways of constructing the concern index. Both approaches will be used in this study and offered for comparison.

The first approach makes itself apparent when examining the poll questions. Only poll questions allowing for a true "most concerned" or "extremely concerned" response are included. These questions typically allow three or four response levels and may serve to sample the proportion of individuals who are genuinely the most concerned. The index consists of the response frequency in the category indicating the most concern.

The primary drawback of this approach is the more limited occurrence of this variety of poll question. Nonetheless, this method will be investigated. This index will be referred to as the "extreme concern index" or ECI.

Alternately, questions may be used which allow the responses to be divided into two categories: concerned and not concerned. Many of the questions are devised this way, for example: Do you think the greenhouse effect is a serious problem (yes or no)? The questions

which make up the extreme concern index are also included in this index by combining the most concerned half of those questions (the two highest response categories). This index will be referred to as the "high concern index" or HCI.

In either case, the goal of this measurement of public opinion is to simulate, across time, the question: How concerned is society about the greenhouse effect? The concern index is therefore the percentage of respondents who report themselves into either the above average (HCI) or the extremely concerned (ECI) category of the polls. The two approaches to taking this kind of measurement will be compared.

The validity of the concern index might be a somewhat open question. Precisely what is being measured here? Agenda-setting research has typically sought to measure a cognitive, rather than an affective, response in public opinion: what people are thinking about rather than what they actually think. Calling this a "concern" index implies the opposite. However, the term is admittedly being used loosely. It is very likely that in this context "concern" equates better with "thinking about" than with "thinking."

The reliability of the concern index can be more directly addressed. Since the response categories clearly determine how the index is put together, the main source of difficulty concerning the reliability of the concern index involves the selection of questions to be used from the set of all questions supplied. To address this issue a randomly selected set of five months were subjected to an intercoder reliability test. All poll questions were gathered and given to two other individuals who were then instructed on the method of selecting a set of questions to be used to construct the index.

Using Scott's *pi*, an intercoder reliability of .83 was achieved (.75 is generally considered to be acceptable).

## C. Data Analysis

The statistical analysis of time series is a topic of considerable complexity. To address the hypotheses, this study employs the set of statistical tools common to the current agenda-setting literature.

First, the cross-lagged correlation coefficient is used to determine the strength of association between variables across time. The maximum lag utilized is six months. The bi-directional application of this test is applied to a 2 by 4 factorial arrangement (the two concern indices by the three media measurements and the media index). Eight two-way relationships are thus evaluated.

Both directions of each bivariate relationship are assessed to evaluate the hypotheses. For example, concern is correlated with television one month earlier, two months earlier, and so forth to six months earlier. The same analysis includes the correlation of television with concern one month earlier to six months earlier.

To provide a base line, this test is first run on the raw data, with no estimated cases for either the HCI or the ECI. However, the interpretation of any significant correlation is somewhat hampered by the non-uniformity of the raw series. The next step in the analysis therefore involves the analysis of the time series after being made uniform with estimated cases. Unfortunately, interpretation is further hampered by the non-stationarity of the time series with respect to trend.

Given any two time series which might contain a trend, say IBM stock and a mosquito population, cross-lagged correlation will almost always yield a connection. Therefore, even when two time series are theoretically linked, any degree of causal inference is thwarted unless both series are first made stationary by some method (McCleary & Hay, 1980; Krull & Paulson, 1977; Chatfield, 1989).

Brosius and Kepplinger (1992) demonstrate a straightforward approach in a recent agenda-setting study. They suggest that the best procedure is to eliminate the trend with a linear transformation achieved by regressing the time series on its own serial component.[11] To accomplish this with the data on media as the dependent variable, for example, a regression equation using the case number as the independent variable (1-66 ascending through time) is computed. The residuals from this regression then constitute the new time series on which the cross-lagged correlations may be computed and interpreted.

Essentially, this procedure levels the playing field between the variables. The variance represented by long-term changes in the averages is removed. Therefore, the only variance being correlated is that which cannot be attributed to a long-term trend. This allows a clearer picture of any short-term relationships which may exist between the variables.

McCleary and Hay (1980) discuss the interpretation of such a series of cross correlation functions (CCF):

> Among other things, this exercise illustrates the interpretation of asymmetry in the CCF. *The CCF measures not only the strength of a relationship but also the direction.* When "$X_t$ causes $Z_{t+b}$," evidence of the relationship is found at CCF(+b), in the positive half of the CCF, that is. When "$Z_t$ causes $X_{t+b}$," on the other hand, evidence of the relationship is found at CCF(-b), in the negative half of the CCF. (p. 232, original emphasis)

The correlation coefficients may be graphed so that, in effect, the causal relationship between the two variables reverses at the origin of the graph. Krull and Paulson (1977) offer a method for how such a series of cross-lagged correlations may be graphed and interpreted:

> The pattern one would typically expect for an unambiguous set of cross-correlations . . . The abscissa in the graph gives the lag between the independent and dependent variables;

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[11] Non-linear transformations are inappropriate because they interfere with subsequent stages of this analysis. Specifically, they lead to large negative correlations in the Granger Analysis.

> the ordinate gives the magnitude of the correlation at a given lag. The correlations are nonsignificant (close to zero except for sampling variability) up to a point. Then the correlations show a significant negative or positive peak, followed by nonsignificant correlations. The time period between zero lag and the correlation peak is indicative of the causal lag between the independent and dependent variables. The spread of the peak is indicative of the duration of the effect. (p. 247)

In essence, each quadrant of the graph represents an independent and directional hypothesis (one-tailed tests). Significant correlations in the top left quadrant indicate that concern is positively influencing media coverage. The bottom left quadrant indicates an inverse relationship in which concern influences media coverage.[12] The right side of the graph is similarly arranged for the condition where media coverage influences concern, either positively or inversely.

Thus, cross-lagged correlations are employed to initially address the hypotheses of across-time association between the various measures of media coverage and public concern. These correlations are drawn from the uniform (with estimations) and filtered (trend removed) data. Correlations at any lag which are significant at the .05 level (one-tailed) will graduate to the next level of analysis.

Granger analysis has been employed by a number of agenda-setting studies to further refine the causal link suggested by cross-lagged correlations (see Smith, 1987; Rogers et al., 1991; Brosius & Kepplinger, 1992). Granger analysis states that X is a cause of Y when X predicts Y significantly better than Y predicts itself. Restated, the best predictor of today's public opinion is last month's public opinion. If media coverage predicts today's public opinion better than yesterday's public opinion does, then media coverage may be a cause of public opinion.

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[12] This relationship is not well represented in the agenda-setting literature. However, it is clearly possible that a high degree of media attention could serve to reduce public concern by suggesting that the problem is being attended to by experts and the government.

This intuitively attractive notion is investigated by first regressing Y on its previous value. Then Y is regressed on its previous value plus the value of X at a previous time. The two values for are then compared with an F test to determine if any predictive improvement is actually significant.[13] Significant improvement in $R^2$ by the complete model is compelling evidence that the exogenous variable exerts some form of influence.

Typically, Granger Analysis is employed independently of cross-lagged correlations and is applied to both directions of each lag that is being investigated. This study departs from that approach somewhat by seeking to utilize the concept of Granger Analysis as a device for the verification of the significant cross-lagged correlations. To do this, one Granger set of regression equations is executed for each significant relationship indicated by the set of cross-lagged correlations. If more than one lag from a quadrant yields a significant correlation each significant lag is first evaluated independently. All of the significant lags are then included in a single multiple regression equation.

This method of analysis combines the simplicity of cross-lagged correlation with the more sophisticated and rigorous test for Granger causality. For the purposes of this study, this analytical method will be termed Granger Verified Cross-Lagged Correlation (GVCLC).

In addition to the analysis, simple graphical descriptions will be provided for each unit of observation. As well as graphing the raw data, each measurement will also be estimated through the use of a simple moving average (12 month term). These data will serve to illuminate the nature of the media coverage and public concern over this issue and will be utilized in the discussion.

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[13] The specific form of the F test is one for the comparison of complete and reduced regression models:

$$[F\ df = k\text{-}g/n\text{-}k\text{-}1] <> (R^2_c - R^2_r / k - g) / (1 - R^2_c / n\text{-}k\text{-}1)$$

where k = independent variables in the complete model and g = independent variables in the reduced model

# IV. RESULTS

## A. Trends

Figures 1 through 6 (the following 6 pages) illustrate the nature of media attention and public concern over the issue of global warming. Media coverage and public concern over global warming have apparently experienced a variety of cycles. While there are differences between the three types of media, on average all three media types do display a similar cycle of attention that is well represented by the Media Index.

The relative volatility of the television and magazine data as compared to the newspaper data is partially a factor of the number of individual media being examined (three each for television and magazines, but five for newspapers). Also, sheer volume plays a role since the magazines are weekly while the other media publish or broadcast daily.

The linear equations used to eliminate trend are superimposed on each raw data display. Overall, television and newspaper attention to global warming has increased slightly for the period of the study, while magazine attention has remained about flat. Of course it is important to remember that a regression line is influenced strongly by end points and by extreme values. It is interesting to note that little long-term trend is apparent in either the HCI or the ECI.

Just by "eyeballing" the set of trend lines one can see that television has the most similarity to both the ECI and the HCI. A more rigorous empirical examination of such relationships follows in the next section.

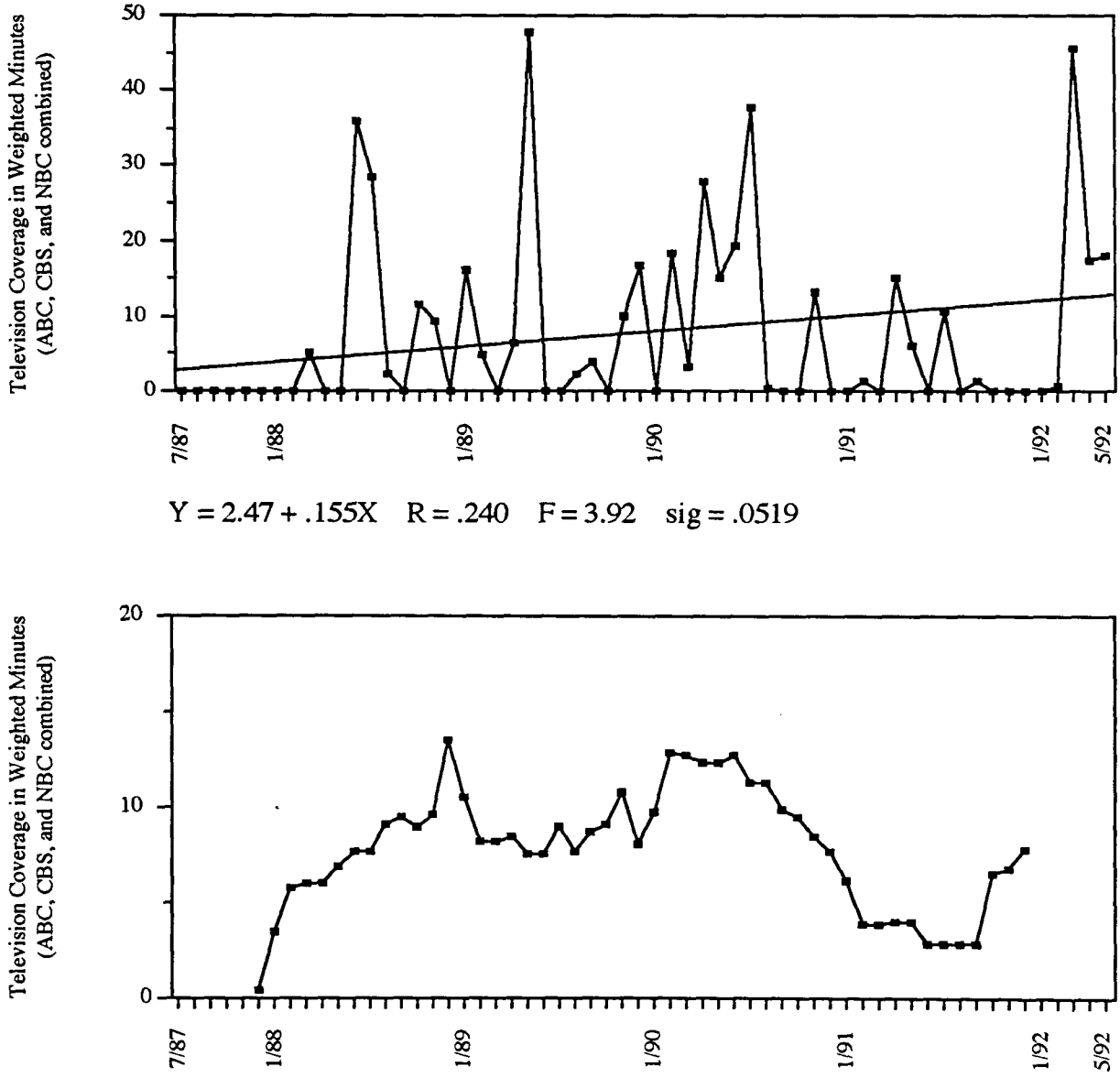


**FIGURE 1. TELEVISION COVERAGE**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for television coverage of global warming from January 1987 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series.

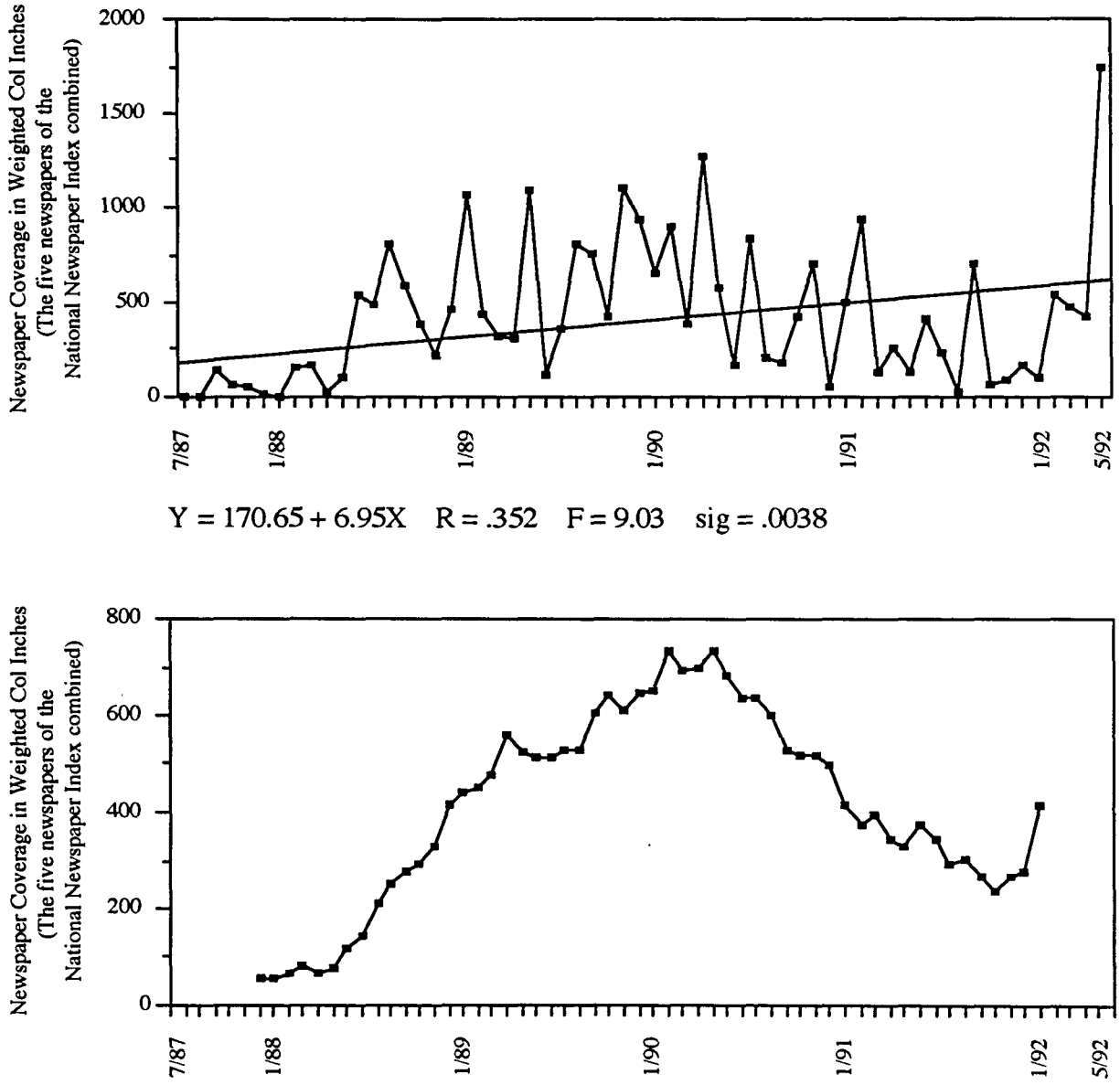


**FIGURE 2. NEWSPAPER COVERAGE**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for newspaper coverage of global warming from January 1987 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series. Newspapers included are *The New York Times, The Christian Science Monitor, The Washington Post, The Wall Street Journal* and *The Los Angeles Times.* Collectively known as the *National Newspaper Index.*

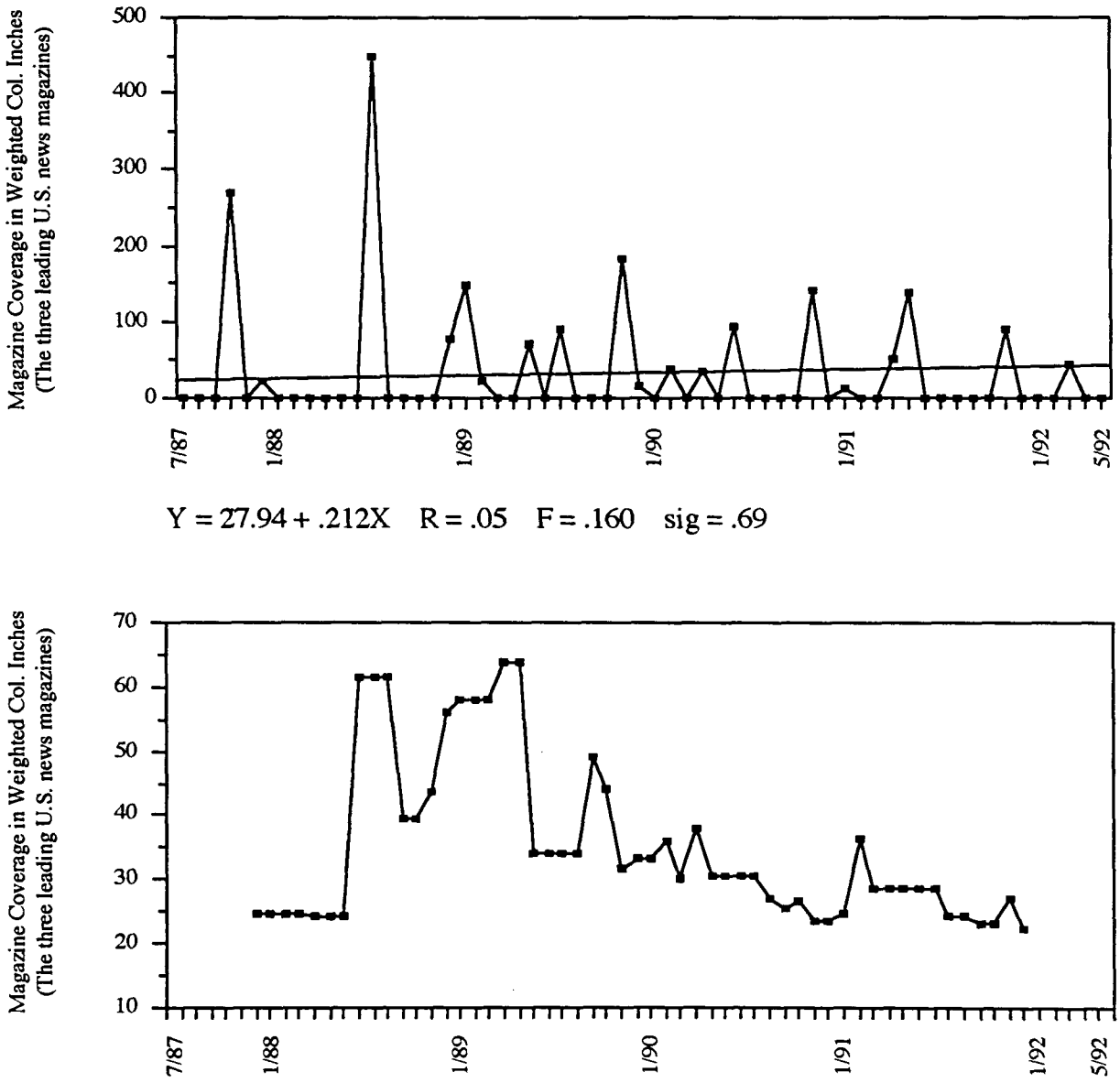


**FIGURE 3. NEWS MAGAZINE COVERAGE**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for news magazine coverage of global warming from January 1987 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series. Magazines included are *Time, Newsweek,* and *U.S. News & World Report.*.

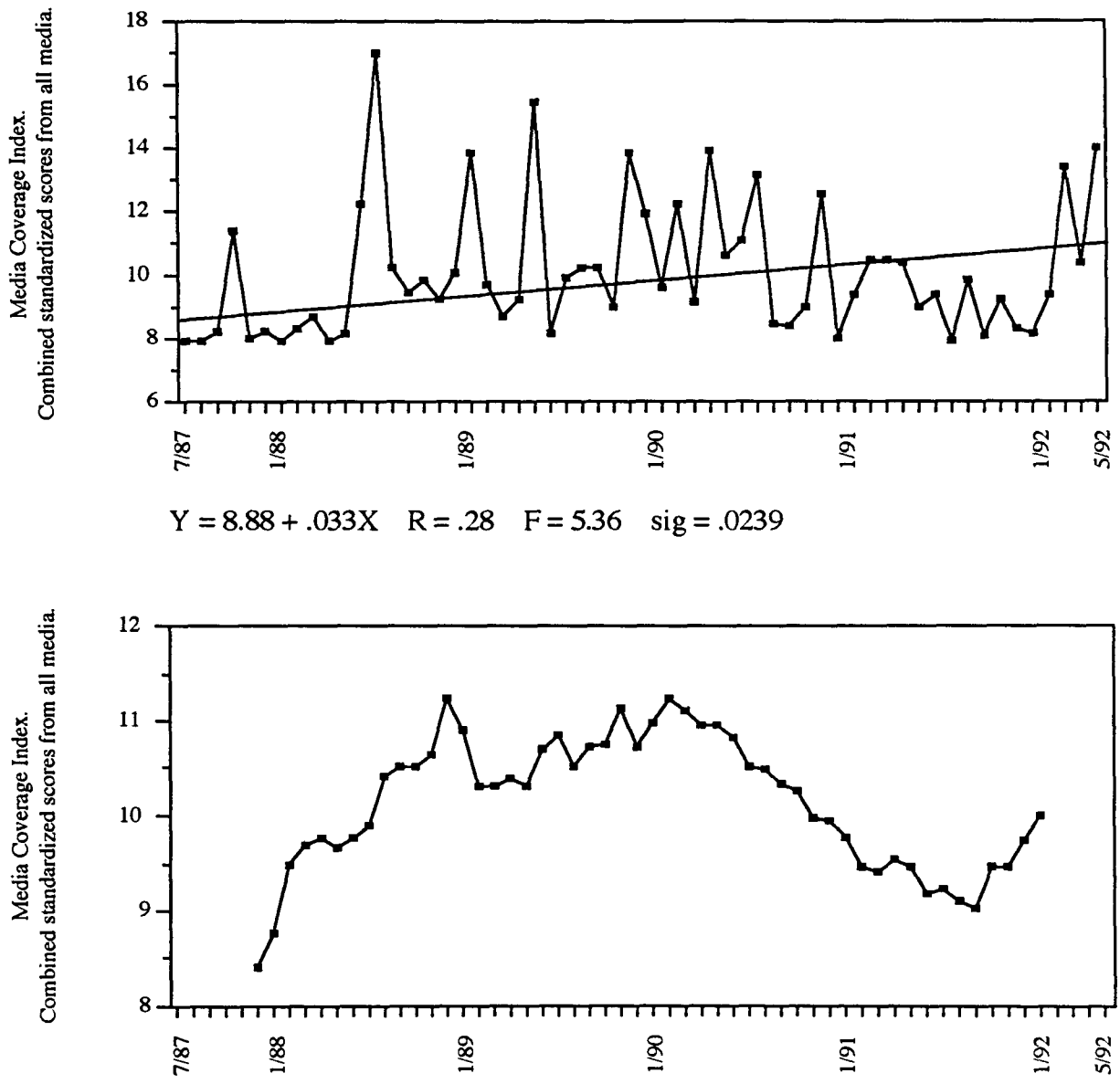


**FIGURE 4. MEDIA INDEX**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for the media index coverage of global warming from January 1987 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series. The media index is the summed standardized scores of television, newspaper, and magazine coverage (10 is added to that sum, so the mean coverage for the period is 10).

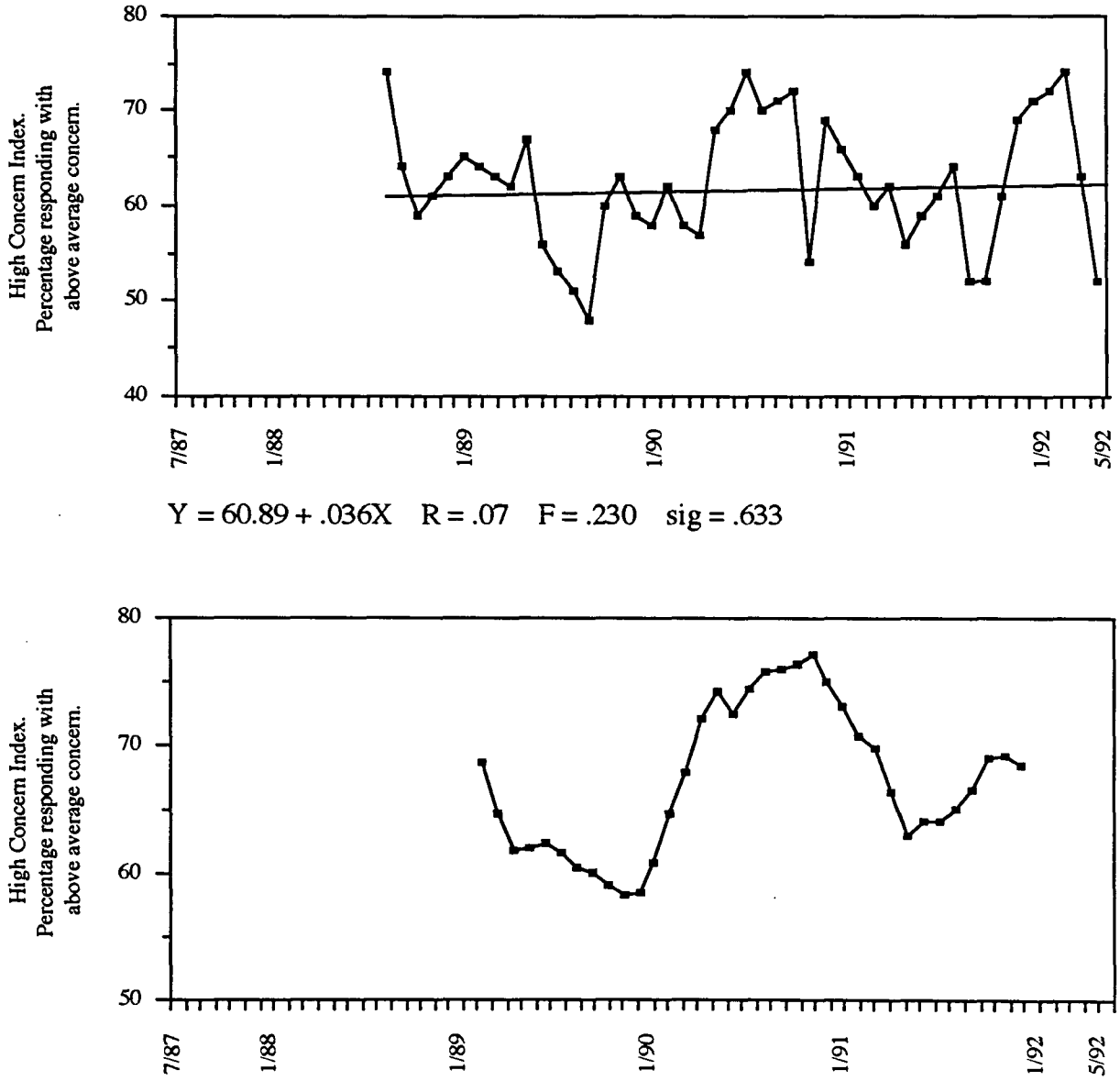


**FIGURE 5. HIGH CONCERN INDEX**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for the high concern index of global warming from June 1988 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series. The high concern index is the percentage responding with above average concern to poll questions on global warming.

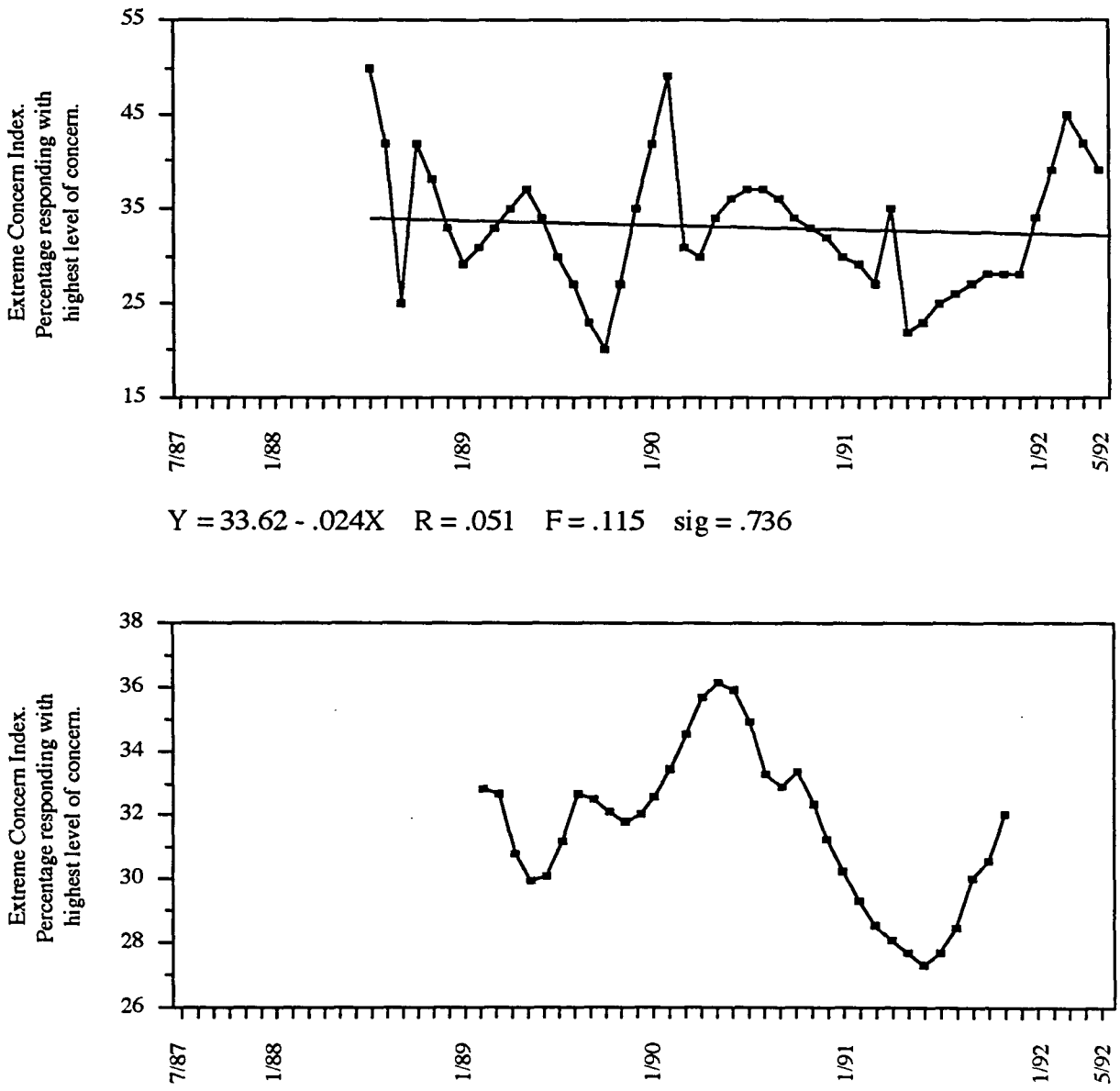


**FIGURE 6. EXTREME CONCERN INDEX**
Raw time series (top) and modeled time series (bottom, 12 month moving average) for the extreme concern index of global warming from June 1988 to May 1992. Beginning and ending cases are lost in the moving average. The linear trend utilized in the pre-whitening is plotted on the raw series with the equation appearing below that series. The extreme concern index is the percentage responding with the highest concern level in poll questions on global warming.

## B. Correlations

What influential relationships may exist between these time series? As a point of departure, Table 1 (next page) presents the set of cross-lagged correlations derived from the raw data, prior to estimating missing cases and pre-whitening. These data suggest feedback relationships involving each form of media and the measures of public concern. But because of the various difficulties involving time series and correlations, these data are of limited utility. Nonetheless, they are presented in conjunction with a question: Does further analysis agree with these results? This question will be returned to shortly.

Figures 7 through 10 (following pages) present the same set of cross-lagged correlations derived from the pre-whitened data. These results are presented in the graphical format suggested by Krull and Paulson (1977) previously described. The horizontal middle zone represents the rejection region in which significance at the .05 level was not achieved.

Overall, there are significant positive correlations involving television and the ECI, newspapers and the ECI, magazines and the HCI and finally the media index and the ECI. The relationship between television and the ECI (figure 7) suggests a feedback relationship of four months duration with a bias toward public concern influencing television coverage. The only significant relationship between newspapers and the ECI (figure 8) occurs where public concern leads newspaper attention by two months.

The composite measure of all three media shows a feedback relationship with the ECI (figure 10). This relationship is strongest where public concern leads media coverage by two or three months or occurs concurrently with it during the zero month. The only significant correlation involving the HCI occurs with that measure of public concern leading magazine attention by four months (figure 9).

**TABLE 1. CROSS-LAGGED CORRELATIONS ON UNFILTERED AND UNESTIMATED DATA**

This set of correlations was produced using the original data set for this study prior to the inclusion of any estimated cases or any pre-whitening technique. These correlations are included as a form of benchmark only. Because each time series contains some degree of trend, causal linkages between unfiltered series cannot be inferred.

| t - 6 | t - 5 | t - 4 | t - 3 | t - 2 | t - 1 | t - 0 | t - 1 | t - 2 | t - 3 | t - 4 | t - 5 | t - 6 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | High Concern causes Television | | | | Television causes High Concern | | | | | |
| -.1588 | -.2346 | .0804 | .1225 | -.0063 | -.0027 | .2828 | .1829 | .1139 | .3069* | -.2574 | .0424 | .2013 |
| | | | Extreme Concern causes Television | | | | Television causes Extreme Concern | | | | | |
| -.2493 | .2811 | -.1594 | .3216 | .1847 | .1518 | .5060** | .1270 | .3138 | .0296 | .1758 | -.3475 | -.1771 |
| | | | High Concern causes Newspapers | | | | Newspapers cause High Concern | | | | | |
| .1766 | .0355 | .0405 | -.0768 | .0469 | -.0303 | -.1554 | -.1317 | .0512 | .1554 | -.2029 | .1485 | .3903* |
| | | | Extreme Concern causes Newspapers | | | | Newspapers cause Extreme Concern | | | | | |
| -.2396 | .3246 | -.3884* | .4348* | .5050* | -.1330 | .3507 | .0060 | .2031 | .0871 | .0256 | -.0813 | .0699 |
| | | | High Concern causes Magazines | | | | Magazines cause High Concern | | | | | |
| .1618 | .1245 | .3696* | .2792 | -.4998** | -.2329 | -.0279 | .3462* | -.0179 | -.0517 | -.0571 | -.3687* | .0391 |
| | | | Extreme Concern causes Magazines | | | | Magazines cause Extreme Concern | | | | | |
| -.1350 | .2817 | .1313 | .3572 | .0550 | -.0791 | -.0666 | .1704 | -.1925 | .3008 | .0132 | -.1901 | -.1745 |
| | | | High Concern causes Media Index | | | | Media Index causes High Concern | | | | | |
| .0611 | -.0514 | .1578 | .1377 | -.1386 | -.1001 | .0530 | .2095 | .0674 | .1667 | -.2420 | -.0380 | .2611 |
| | | | Extreme Concern causes Media Index | | | | Media Index causes Extreme Concern | | | | | |
| -.2391 | .3774 | -.2239 | .4404* | .4167* | -.0205 | .4250* | .1599 | .1329 | .2258 | .0905 | -.2554 | -.1257 |

*$p < .05$ ** $p < .01$ High Concern n = 30 Extreme Concern n = 21

Since figures 7 through 10 essentially represent a matrix of 104 correlations tested at the .05 level, it is necessary to consider the possibility that 5 of the 10 significant correlations are the result of random probability. This problem can be dispatched with two observations. First, the probability of all 5, or even more than 1 of the potential random events being contained within the full set of 10 is small. Further confidence can be derived from the fact that all of the significant correlations are positive. A random influence should produce an equal number of negative and positive correlations.

Because of the generally experimental nature of this measurement of public opinion, it may be useful to compare the results arrived at with the estimated and filtered data with the results from the raw data. Of the fourteen significant correlations indicated by either the treated or untreated data, six are in complete agreement.[14] Another three are significant in the raw analysis but are just shy of significance in the filtered analysis.[15] One is significant in the filtered analysis but just fails the test in the raw approach.[16]

Four of the correlations are in discord. Three are significant in the filtered analysis but are far from significant on the raw series.[17] However, these three are clustered about the mutually agreed upon relationships for television and so don't provide much surprise.

Taking all of this into consideration, there seems to be sufficient agreement between the two treatments to suggest that the estimation of missing cases and the filtering of the data did not create relationships where none exist. Treating the data may have caused four relationships to be overlooked: television influences the HCI (t-3), and the three negative correlations did not appear in the filtered data. However, these correlations amy have been caused by trend.

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[14] HCI (t-4) causes magazines; ECI (t-1) causes newspapers; ECI and television feedback at (t=0); ECI and Media Index feedback at (t=0); ECI causes Media Index at (t-1) and (t-3).

[15] Magazines (t-1) cause HCI; ECI (t-3) causes newspapers; Newspapers (t-6) cause HCI.

[16] ECI (t-3) causes television.

[17] ECI (t-2) (t-1) causes television; television (t-1) causes ECI.

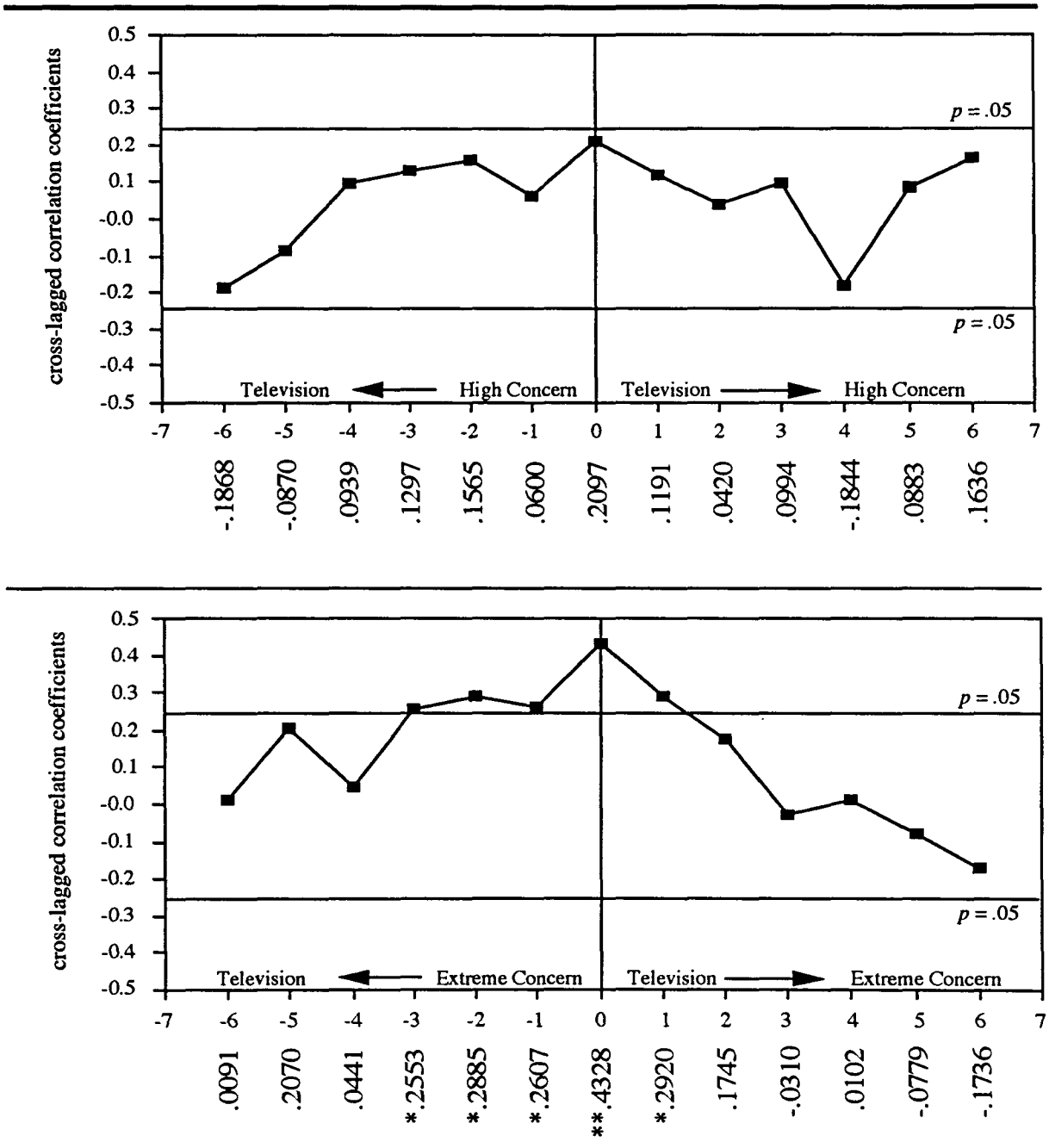


**FIGURE 7. TELEVISION AND PUBLIC CONCERN.**
Cross-lagged correlations on pre-whitened time series for television with the high concern index (top) and television with the extreme concern index (bottom). Both causal orderings are reflected on opposite sides of the graph. Precise correlation coefficients appear beneath each graph (* $p < .05$ ** $p < .01$). The horizontal lines across the graph represents the strength of the correlation required to achieve significance at the .05 level in a one tailed test when n = 42. The middle area is the rejection region.

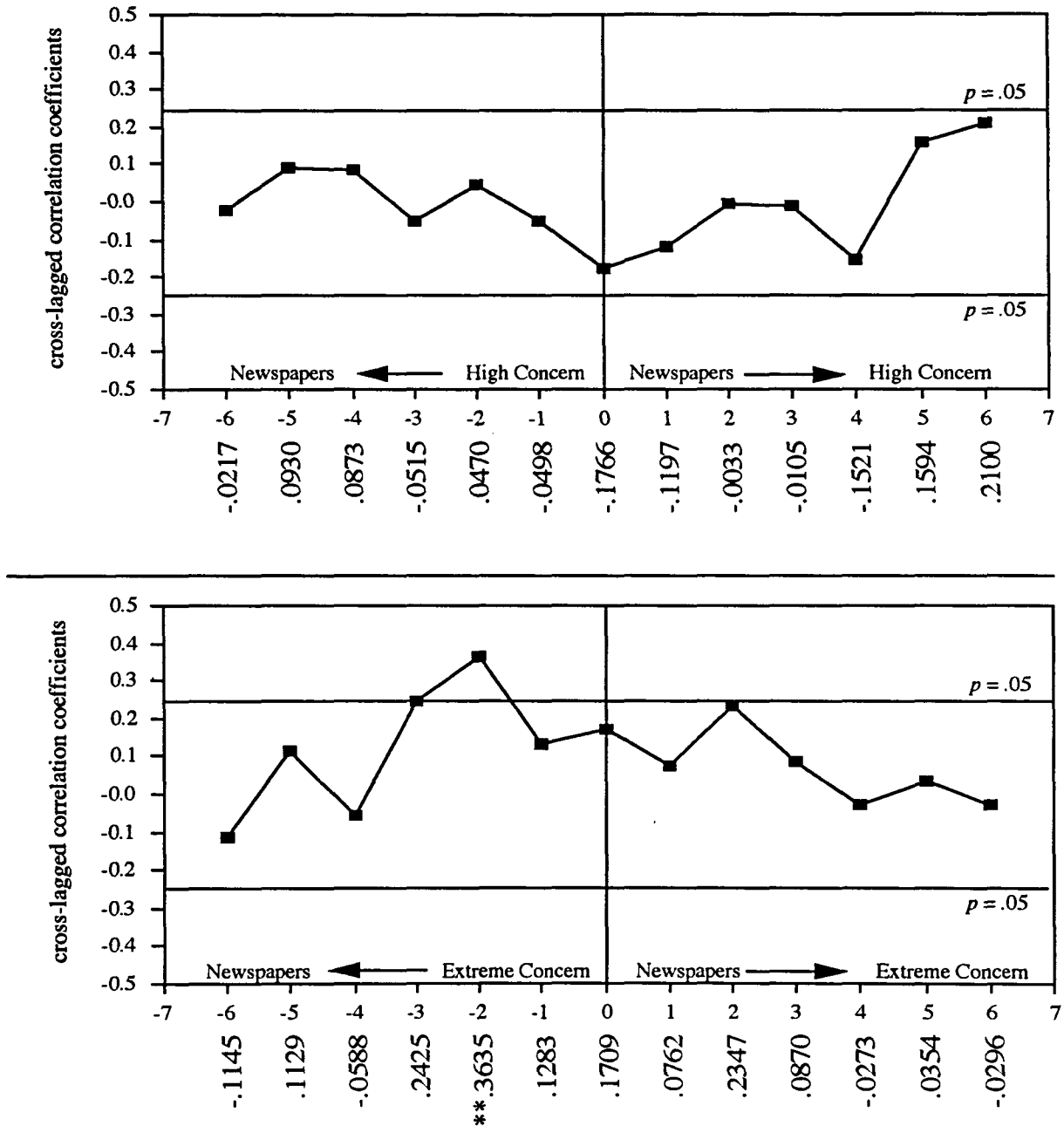


**FIGURE 8. NEWSPAPERS AND PUBLIC CONCERN.**
Cross-lagged correlations on pre-whitened time series for newspapers with the high concern index (top) and newspapers with the extreme concern index (bottom). Both causal orderings are reflected on opposite sides of the graph. Precise correlation coefficients appear beneath each graph (* $p < .05$ ** $p < .01$). The horizontal lines across the graph represents the strength of the correlation required to achieve significance at the .05 level in a one tailed test when n = 42. The middle area is the rejection region.

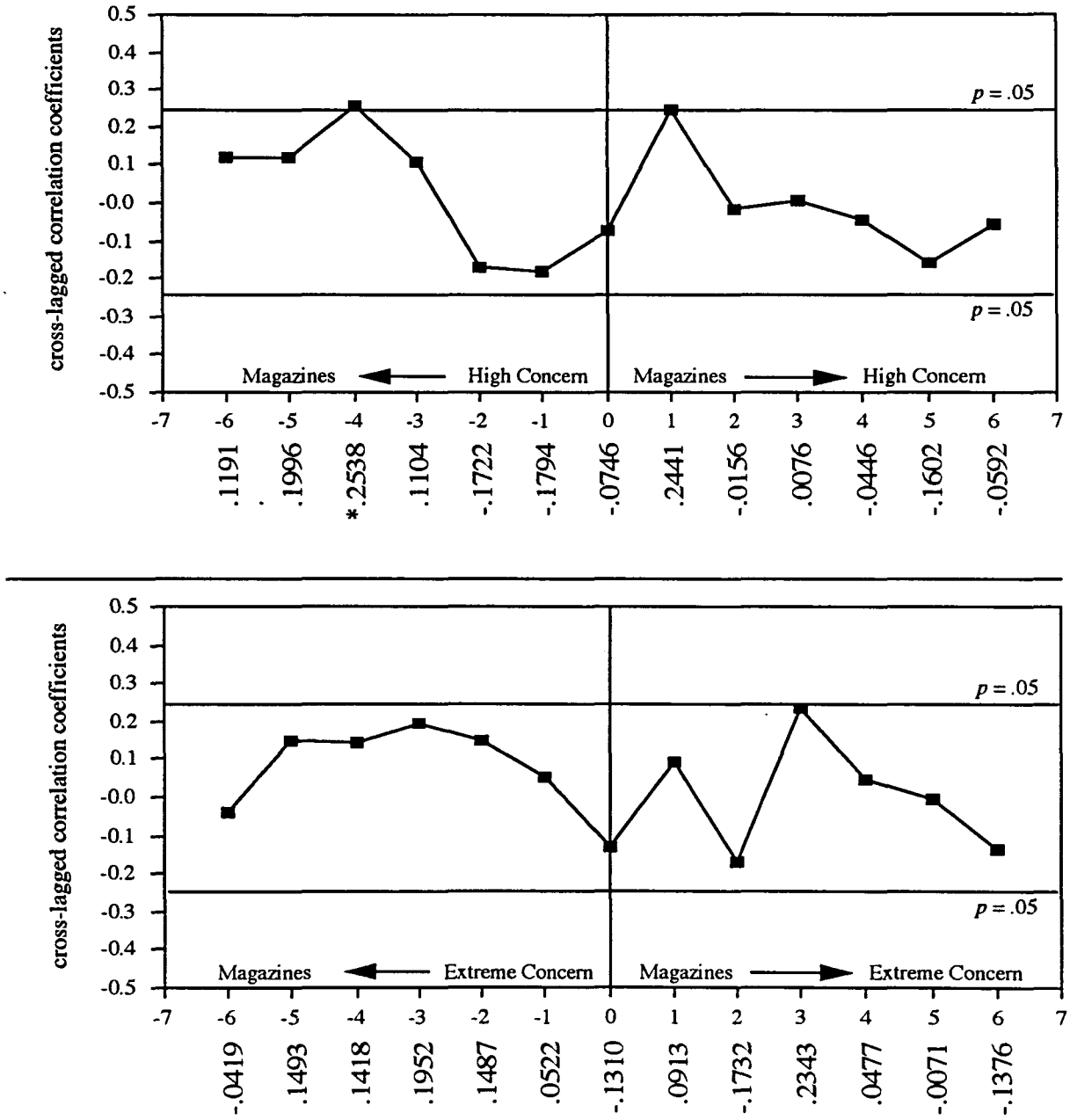


**FIGURE 9. MAGAZINES AND PUBLIC CONCERN.**
Cross-lagged correlations on pre-whitened time series for magazines with the high concern index (top) and magazines with the extreme concern index (bottom). Both causal orderings are reflected on opposite sides of the graph. Precise correlation coefficients appear beneath each graph (* $p < .05$ ** $p < .01$). The horizontal lines across the graph represents the strength of the correlation required to achieve significance at the .05 level in a one tailed test when n = 42. The middle area is the rejection region.

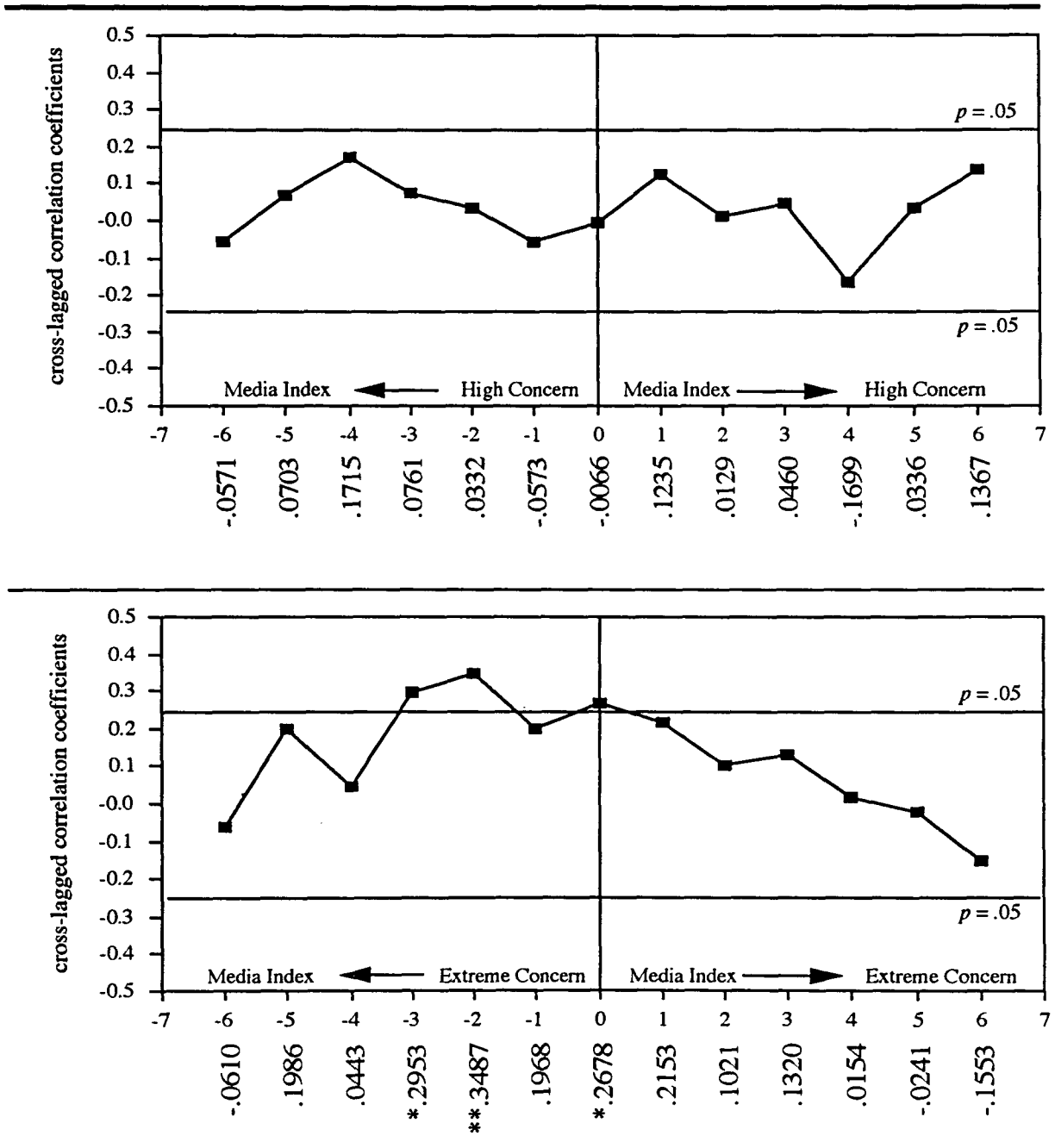


**FIGURE 10. MEDIA INDEX AND PUBLIC CONCERN.**
Cross-lagged correlations on pre-whitened time series for the media index with the high concern index (top) and the media index with the extreme concern index (bottom). Both causal orderings are reflected on opposite sides of the graph. Precise correlation coefficients appear beneath each graph (* $p < .05$ ** $p < .01$). The horizontal lines across the graph represents the strength of the correlation required to achieve significance at the .05 level in a one tailed test when n = 42. The middle area is the rejection region.

## C. Granger Verification

The results of the cross-lagged correlation of the filtered data suggest that there are six relationships to be investigated further: television causes ECI; ECI causes television; HCI causes magazines; ECI causes newspapers; Media Index causes ECI; ECI causes Media Index. The veracity of each of these relationships is further tested through Granger Verification. Table 2 shows the application of the Granger Verification and Figure 11 presents the significant results of that verification in a relational schematic (following pages).

Overall, television coverage of global warming and public concern (as measured by the ECI) appear to be in a feedback relationship. Public opinion's impact on television seems to be somewhat stronger and of greater duration than the inverse arrangement. There is evidence that the newspapers utilized in this study follow more than lead. Magazine coverage of global warming has little connection with public opinion. Finally, a feedback relationship is shown between the Media Index and the ECI.

It is probably best to simply dismiss the case of the relationship between the Media Index and the ECI. This relationship is almost certainly an artifact of the television-ECI correlation. This result is illustrative of the importance of considering independently a variety of media in agenda-setting studies.

The effects of multicollinearity must be considered for the case within the Granger Verification that reports a significant incremental $R^2$ which is derived from multiple regression. In the case of concern influencing television across a three month lag, the independent variables are themselves correlated.[18] This result should be accepted provisionally.

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[18] For TV as the dependent variable and the ECI (t=0)(t-1)(t-2)(t-3) as independent variables the correlations are (* sig at .05, ** sig at .01 in two-tailed test):

| ECI | (t-1) | (t-2) | (t-3) |
|---|---|---|---|
| (t=0) | .54** | .30* | -.002 |
| (t-1) | — | .54** | .30* |
| (t-2) | — | — | .52** |

**TABLE 2.**
**GRANGER VERIFICATION OF SIGNIFICANT CROSS-LAGGED CORRELATIONS**

Each significant correlation from the cross-lag analysis is subjected to an F test for a comparison of complete and reduced regression models. The reduced models consist of the dependent variable regressed on itself at (t-1). Complete models are regressed on the (t-1) lagged endogenous variable plus on one or more lags of the other variable in question. When more than one lags are significant in the cross-lag analysis each individual lag is compared separately before a model containing all significant lags.

| see figure | Dependent Var | Independent Variables | $R^2$ | Increment |
|---|---|---|---|---|
| 7 | ECI | ECI (t-1) | .460 | |
| | | ECI (t-1) TV (t=0) | .546 | .086 * |
| | | ECI (t-1) TV (t-1) | .462 | .002 |
| 7 | TV | TV (t-1) | .006 | |
| | | TV (t-1) ECI (t=0) | .223 | .217 ** |
| | | TV (t-1) ECI (t-1) | .081 | .075 |
| | | TV (t-1) ECI (t-2) | .059 | .053 |
| | | TV (t-1) ECI (t-3) | .014 | .004 |
| | | TV (t-1) ECI (t=0) ECI (t-1) ECI (t-2) ECI (t-3) | .256 | .250 * |
| 9 | MAG | MAG (t-1) | .041 | |
| | | MAG (t-1) HCI (t-4) | .050 | .009 |
| 8 | NP | NP (t-1) | .002 | |
| | | NP (t-1) ECI (t-2) | .115 | .113 * |
| 10 | ECI | ECI (t-1) MI (t=0) | .510 | .050 * |
| 10 | MI | MI (t-1) | .012 | |
| | | MI (t-1) ECI (t=0) | .148 | .136 * |
| | | MI (t-1) ECI (t-2) | .091 | .079 |
| | | MI (t-1) ECI (t-3) | .032 | .020 |
| | | MI (t-1) ECI (t=0) ECI (t-2) ECI (t-3) | .182 | .170 |

ECI = Extreme Concern Index HCI = High Concern Index
TV = television MAG = magazine MI = media index NP = newspaper

* $p < .05$
* * $p < .01$

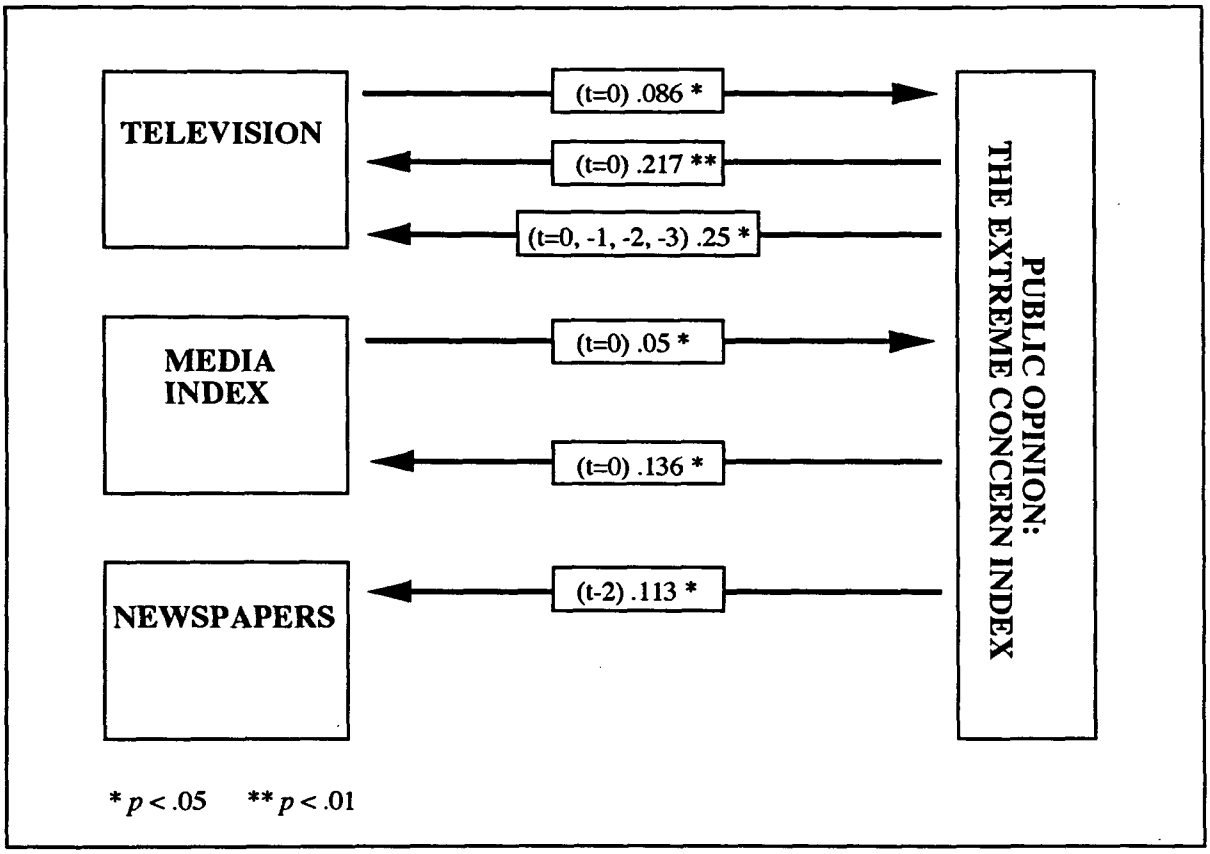


**FIGURE 11. RELATIONAL SCHEMATIC OF GRANGER VERIFICATION— HYPOTHESIS TESTS**
The relationships described in the Granger Analysis are graphically depicted here. Causal direction is indicated by the arrows. Data in the boxes are incremental $R^2$, significance, and length of lag on independent variable (source of the arrow).

For the case of television, the third hypothesis is supported: there is an interaction effect between television and public concern during the (t=0) month. There is also support for the second hypothesis: public concern influences television over a period of the three previous months.

For the case of the media index the third hypothesis is supported: there is an interaction effect between media and public concern during the (t=0) month.

For the case of newspapers the second hypothesis is supported: public concern influences newspapers at a lag of two months.

## D. Hypotheses

The first hypothesis, which states that media coverage influences public concern, is not explicitly supported by the results of this study. There is no single lag in which media attention significantly increments public concern in the absence of the reverse effect. The only cases where there may be evidence of media influencing public concern is in the zero months of both television and the Media Index (which, as previously noted, is most likely an artifact of television). But since these lags also contain a significant incrementation in the opposite direction it is impossible to isolate a single directional influence.

The second hypothesis, which mirrors the first, does have explicit support in the case of public concern influencing newspaper coverage at a lag of two months. There is also support for public concern exerting a diffuse influence over television coverage across a period of three months. Once again however, the significant increments in the zero lags of television and the Media Index cannot be isolated in order to support this directional hypothesis.

The third hypothesis, a prediction of mutual influence, receives the strongest support in the case of television coverage and public concern over global warming. The relationship between the Media Index and public concern also displays evidence for the third hypothesis, but is most likely a "shadow effect" from television.

It is difficult to ascribe much meaning to the greater directional influence at the zero lag for the influence of public concern over television coverage. It is interesting to note that this bias is in the direction that is further supported by the three-month-long diffuse influence of concern over television. However, since all of the opinion polls were not conducted at the same time during each month, and the measure of media attention is a sum total for the entire month, the bias within the zero lag has little empirical support for meaning in and of itself.

# V. DISCUSSION

## A. Limitations and Opportunities

The results of this study are perhaps most notable given the nature of the measurement of public concern developed in this study. The success of combining the response rate of the "extremely concerned" category from various polls suggests that this approach may actually measure what it is purported to. Observing variance in the extreme category of the polls appears to be more sensitive than looking at the above average amounts of concern. It should be noted that the polls included in the ECI are more uniform in nature (all employ some form of a Likert scale) than the polls used to construct the HCI.

Aggregating various opinion polls across time may be a useful technique for agenda-setting research. Work toward refinement and validation of this technique is warranted and is perhaps the most important direction for further investigation suggested by this study.

Conversely, it must also be stressed that such utilization of poll results has not been attempted before. This is clearly the weakest point of this study. An important related issue which bears opportunity for further investigation is that of independence between the polls and the media attention. From that observation one must move on to consider the role of opinion polling in the process of defining news. Do the opinion polls help serve to create a feeding frenzy, or a "hoopla effect?"

Overall, it is perhaps not so surprising is that there is an effect detected. Given the nature of the issue of global warming, the news media must play an important role in the social definition of global warming. But it should still be stressed that these results do not rule out the possibility that all of the significant relationships indicated here result from the influence of another unknown variable(s) or processes. It could be argued that agenda-setting research in mass communication suffers from a fetishism of determinacy: desperately seeking "causes."

The thorny issues of causality aside, some *relationships* do seem to exist in this case. These are worth considering further.

Finally, it is interesting to note the hierarchy of effect which exists within the three specific media examined. Television clearly displays the greatest relationship with public concern, newspapers have a more limited relationship, and magazines have no relationship. As previously mentioned, this is probably a consequence of this study's design. The national surveys used for the ECI most closely match the audience for television. However, another factor may also be in play. It may also be that television simply leads the pack and offers the most immediate and responsive coverage of the news. Magazines have been used as an "index" of overall media coverage in past studies. Newspapers may also play a similar function.

Further research considering intermedia agenda-setting relationships would help to settle this question. Did the television coverage influence subsequent newspaper coverage? Such a finding might also strengthen the validity of the finding that public concern influences newspaper coverage two months later by suggesting the possibility of that influence being an artifact of the influence of television over newspapers.

### B. Interpretation and Relationship to Other Research

This study bears out many aspects of previous work done in agenda-setting. The use of an unobtrusive international issue undoubtedly contributed to the detection of an effect. Winter and Eyal's (1981) finding that recent media attention has a much greater agenda-setting effect than long-term media attention would seem to be born out by the strength of the relationship between television and the ECI. Finding a strong relationship despite the considerable noise within the data sets would suggest a greater responsiveness to the immediate effects over the long term effects. Schoenbach's (1991) finding that television tends to "spotlight" issues which are being covered more thoroughly in the print media may also be evidenced by these results.

It is more difficult to apply Mazur's (1981) contention that the mere presence of a controversial technical issue in the media tends to garner negative public reaction. Can concern, or even attention, be considered a negative reaction? Mazur's observations probably cannot be applied to the issue dynamics of global warming until the media is covering controversial solutions being proposed by science and technology. For now, the issue is still a debate over credibility and the question, is global warming real?

The impact of public opinion on television coverage may indicate, as Rogers et al. (1991) suggest, that the polling process may be influencing media coverage. In their study of the issue of AIDS, they found a reciprocal relationship between media coverage and the amount of polling on the issue that "suggests that media organizations sponsored polls that asked questions about AIDS and then created news stories (often several part stories) based on the poll results (p. 43)."

Another interesting aspect of these results is the relative strength of the television-opinion relationship as compared to the print-opinion relationship. Two possible explanations for this are advanced. Many researchers believe that television has more social authority than other media. Iyengar and Kinder (1987) make a case for the agenda-setting power of television news: "Television news is not only distinctive in its focus . . . but also in its presentation. Television news is news without ambiguity, equivocation, or uncertainty. It is, or poses as, authoritative news. Most Americans, most of the time, seem to find this authoritative pose irresistible (p. 126)."

A possible explanation may also be found in the fact that the sample of the national surveys used in this study most closely matches the audience for the national network news. There is a more universal exposure to television news than to any of the specific print outlets examined.

Issues of methodology aside, what can be said of the life course of the issue itself? Perhaps it could be said that the issue of global warming has enjoyed its day in the sun. Puns

aside, a serious problem presents itself if one considers that, in terms of scientific understanding, there was probably little substantive change in the issue of global warming during the span of this study. Science has its own time table. While it is easy to understand the spike of sensational coverage associated with Dr. Hansen's testimony during the summer of 1988, the later build-up and eventual decline of coverage — and subsequent concern — presents a more complex problem. What forces might drive such a cycle?

To consider the forces at work behind this issue it will be instructive to first look at some additional information about the issue of global warming. First, it is necessary to address the question of scientific consensus. How controversial is global warming amongst the scientists?

On one hand, a modest (n = 22) survey of environmental scientists asked about the reality of human induced global warming. The results suggest a fairly strong agreement on the issue (Slade, 1990). Fully 81 per cent felt confident that there would be some form of climate change caused by human activity. But there was unanimous agreement that science is still in for "some surprises." The majority believe that the early stages of such changes have already been observed and that current computer models are useful tools for evaluating climate change.

On the other hand, a more thorough survey (n = 400) of climatic, oceanic and atmospheric scientists conducted in 1992 by Gallup for the Center for Science, Technology and Media suggests less certainty about some aspects of the issue (Lichter & Lichter, 1992). The survey reports that only about half of the scientists (51%) feel that climate change is well understood. Most (90%) describe it as "an emerging science." But, the survey reports that more feel that global temperatures have increased (60%), and that nearly half think there will be a significant (two degrees Celsius) increase in global temperature (47%). However, only a few (19%) are sure that such increases in global temperature are clearly the result of human activity rather than natural fluctuations.

Science is a culture of probability. These questions may say more about scientific faith in the research results from complex studies than about gut feelings. Beyond the caveats, two

thirds of the scientists (66%) reported that they personally feel that human activity has already begun to warm the planet.

Global warming is a confounding issue. Its dimensions involve high economic and environmental stakes, scientific uncertainty, politics, public perceptions of risk, and the vagarious nature of mass communication. On that last dimension, the Gallup survey reports that 82 per cent of the scientists follow popular media reportage "very" or "fairly" closely. Unfortunately, just less than a third feel that the media are doing a "good" or "excellent" job of reporting on global warming (fair, 46%; poor, 24%).

Further insight as to what may be going on with the issue of global warming is provided by a recent study published by The Center for Media and Public Affairs (Lichter & Lichter, 1992). Their research takes a look at the media representation of this issue in light of the type of sources providing information. They use the same set of print outlets as does this study, and cover the time period of January 1985 to August 1992.

The study suggests that the flurry of media coverage leading up to the issue's peak in 1990 was the result of a sharp increase in Bush administration sources vigorously challenging the scientific sources. As the report states, "the scientific debate became enmeshed in political struggles (p.2)."

Additional evidence supporting this charge is supplied by Miller's (1990) content analysis of the emergence of global warming as an agenda item from 1987 to mid 1989. By quarters, he examines the types of sources represented in Associated Press stories mentioning global warming. By dividing the period in three phases he found a significant decrease in scientists being used as sources in stories (dropping from 91% of the stories to 66%). Concurrently, there was a significant increase in the number of stories using the President as a source (from 12% of the stories to 40%). Congressional sources rose and fluctuated (32% to 49% to 42%).

These studies suggest that political interests may have sought to take control of this issue and effectively gag the free flow of scientific information on an important environmental issue.

This interpretation of the events would suggest that the experts were squeezed out by the politicians, the media became saturated and lost interest, and the issue went into decline.

On a less nefarious note, one might ask if the shifting salience of global warming was just part of a larger process involving environmental issues in general. Many authors have addressed the rise and fall of environmental attitudes over long time spans (for an excellent overview: Dunlap, 1992). While shifts in poll data for the umbrella idea of "the environment" can't be addressed here, it can be reported that, at least for the set of newspapers utilized in this study, the number of stories indexed by the word "environmental" remained fairly constant over the period 1990-1992.[19]

Nonetheless, cyclic attention to issues may simply be typical of American public opinion and media coverage. Might Downs' (1972) "issue-attention cycle" be invoked as an explanation for the rise and fall of global warming on the public agenda? The five stages are recalled in brief from the literature review (p. 30).

1. **Pre-problem**. Only the experts are concerned
2. **Alarmed discovery, euphoric enthusiasm.** Public awareness, political attention.
3. **Realizing the cost**. Reality rears its ugly head.
4. **Gradual decline of interest**. Discouragement, fear, boredom, new issues arise.
5. **Post-problem**. The prolonged limbo.

Does the issue of global warming from 1988 to 1992 demonstrate Down's issue-attention cycle? The time prior to 1988, when global warming was primarily the concern of scientists, might be characterized as the pre-problem stage. The alarmed discovery of Dr. Hansen's testimony seems to match well with former President Bush's euphoric pledge to counter the greenhouse effect with "the White House effect."[20] Did this period characterize stage two?

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[19] Infortrack reports under "environmental": 1990 = 3496; 1991 = 3188; 1992 = 3183.

[20] Bush's campaign comments are reviewed on the ABC News, 12/27/89.

The science bashing carried on by then Chief of Staff Sununu may have promoted the idea that solving the problem of the greenhouse effect would bear an enormous price tag, even though many experts disagreed. Downs stage three? At the time when the trend slope becomes negative the nation was sliding into increasingly difficult economic conditions, was captivated by a Desert Storm, and began anticipating the most unusual presidential election season in recent memory. Fear, boredom, new issues to attend to — stage four?

And what of the fifth stage in the cycle? Is the issue of global warming now entering "a prolonged limbo — a twilight realm of lesser attention?" News coverage of the global warming debate was on the upswing in mid-1992, primarily in response to the "Earth Summit" in Brazil. Is this global warming's last gasp? Will a change of attitude in Washington and an emerging generation of environmentally aware young adults give this issue a second wind?

Rogers et al. (1991) point out that issues in the media are kept alive as new information allows an issue to be continually redefined as "news." Global warming's faltering representation in the media may simply be the result of the nature of the issue itself: scientific progress has been slow and there's been nothing substantially new to report. If this is the case, then the relationship between the media and public opinion poses some difficulty for society as it faces the possibility of coping with chronic environmental problems like global warming.

Yet, rushing to blame the media for "causing" the dismissal of this issue belies the complicated nature of the relationship between media and opinion. Judging from the results of this study, the media and the public worked *together* to dismiss this topic from the agenda. In this light, other questions must be raised. Can society attend to and appraise a potential problem before it reaches the point where it is the cause of regular "news?" Can the news media report topics which may not have a high audience interest rating?

This line of questioning assumes, of course, that the question of global warming has *not* been socially appraised. Was global warming evaluated by the public mind and dismissed? Perhaps the information presented during the life cycle of this issue simply failed to win

sufficient converts to allow it to be defined as a social problem — by whatever social mechanism one wishes to subscribe to.

Of course it may be an error to conclude that the public is not concerned about this issue. Throughout the ups and downs of this time series the concern level of both indices has been reasonably high: never below 50 per cent for the HCI and never below 25 per cent for the ECI. Nonetheless, the apparent fragility of public concern for this issue, and for issues of this variety in general, is enough to give one pause.

As Lippmann points out, "each generation writes its own history of the world." A conclusive description of society's response to the threat of global warming is perhaps something that can only be written by the generation which either looks back on it as folly, or suffers its fury.

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## ACKNOWLEDGMENTS

This thesis is dedicated with love to Jean: wife, best friend . . . and copyeditor.

Gratitude is also extended to my parents, Gwen and Floyd, who provided me with the opportunity to begin this process with an undergraduate education.

And finally, it would be completely remiss to not mention the faculty members of the department of journalism and mass communication with whom I have had the privilege of studying. Thanks to their efforts the world is now a much more intractable, illogical, frustrating . . . and ultimately fascinating place.

## APPENDIX: DEVELOPMENT OF THE CONCERN INDEX

This appendix fully specifies the material utilized to construct both versions of the concern index. The procedure for utilizing this material is specified in the methods chapter. The following is a compendium of the actual poll questions used and pertinent information about those poll questions. Following the questions, the actual data derived from the analysis is presented in Table 3. Finally, an intercoder reliability test is presented.

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MONTH: 08/88
QUESTION: I will read a list of some stories covered by news organizations this past year. As I read each item, tell me if you happened to follow this story: The hot weather this summer and the greenhouse effect:

42 very closely
32 fairly closely
15 not too closely
10 not at all closely
01 can't say

POLLING ORGANIZATION: Gallup for Times Mirror
POPULATION / SIZE / METHOD: National voters / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 42 + 32 = 74
CONTRIBUTION TO EXTREME CONCERN INDEX: 42

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MONTH: 09/88
QUESTION: There have been many reports in the last year about the greenhouse effect [some details mentioned]. Would you describe yourself as:

28 extremely worried
47 somewhat worried
15 little worried
09 not worried
02 don't know

POLLING ORGANIZATION: Analysis Group
POPULATION / SIZE / METHOD: National voters / 1001 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 28 + 47 = 75
CONTRIBUTION TO EXTREME CONCERN INDEX: 28

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MONTH: 09/88
QUESTION: [From a list of several foreign policy issues and developments] Thinking about the next five years or so, please tell me how serious each item is to our country's national security interests: The gradual heating of the earth's atmosphere known as the greenhouse effect?

21 extremely serious
32 very serious
25 somewhat serious
12 not very serious
11 don't know

POLLING ORGANIZATION: Market Opinion Research for Americans Talk Security
POPULATION / SIZE / METHOD: National voters / 1005 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 21 + 32 = 53
CONTRIBUTION TO EXTREME CONCERN INDEX: 21

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MONTH: 10/88
QUESTION: Do you feel the greenhouse effect is:

42 major problem
18 minor problem
03 not really a problem
37 don't know

POLLING ORGANIZATION: University of Kentucky
POPULATION / SIZE / METHOD: Kentucky / 846 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 42 + 18 = 60
CONTRIBUTION TO EXTREME CONCERN INDEX: 42

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MONTH: 10/88
QUESTION: Have you ever read and/or heard anything about global warming sometimes called the greenhouse effect?

58 yes
40 no
02 don't know

POLLING ORGANIZATION: Research Strategy Management for Union of Concerned Scientists
POPULATION / SIZE / METHOD: National voters / 1001 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 58
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 01/89
QUESTION: [regarding a list of topic that have been in the news] Would you say you pay a great deal of attention . . . to the greenhouse effect:

29 a great deal of attention
36 only some attention
26 no attention at all
09 don't know

POLLING ORGANIZATION: Gallup for Times Mirror
POPULATION / SIZE / METHOD: National adult / 2048 / in person
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 29 + 36 = 65
CONTRIBUTION TO EXTREME CONCERN INDEX: 29

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MONTH: 04/89
QUESTION: From what you have heard or read, how serious is this greenhouse effect, is it a problem that is:

52 a serious problem that is getting worse
36 a problem but it has to be kept in perspective
04 not much of a problem
08 don't know

POLLING ORGANIZATION: Atlanta Journal and Constitution
POPULATION / SIZE / METHOD: "The South" / 1227 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 52
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 04/89
QUESTION: As a way of helping to combat global warming, would you personally be willing to reduce the amount of driving that you do?

56 yes
34 no
10 don't know

POLLING ORGANIZATION: Atlanta Journal and Constitution
POPULATION / SIZE / METHOD: "The South" / 1227 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 56
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 04/89
QUESTION: As a way of helping to combat global warming, would you personally be willing to stop using products that come in aerosol spray cans?

78 yes
16 no
06 don't know

POLLING ORGANIZATION: Atlanta Journal and Constitution
POPULATION / SIZE / METHOD: "The South" / 1227 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 78
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 05/89
QUESTION: [from a list of environmental problems] How much do you personally worry about the greenhouse effect or global warming?

35 a great deal
28 a fair amount
18 only a little
12 not at all
07 don't know

POLLING ORGANIZATION: Gallup
POPULATION / SIZE / METHOD: National adult / 1239 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 35 + 28 = 63
CONTRIBUTION TO EXTREME CONCERN INDEX: 35

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MONTH: 05/89
QUESTION: I'm going to list a few environmental issues. Please tell me what you think is appropriate for each one. Global warming known as the greenhouse effect:

39 urgent government action no matter what the cost
33 prompt government action
13 limited government action
02 no government action
13 don't know

POLLING ORGANIZATION: Associated Press / Media General
POPULATION / SIZE / METHOD: National adult / 1084 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 39 + 33 = 72
CONTRIBUTION TO EXTREME CONCERN INDEX: 39

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MONTH: 06/89
QUESTION: Do you think the greenhouse effect -- that is, the theory that the world is getting warmed -- will become a major problem for the world in the 1990s?

56 yes
38 no
06 don't know

POLLING ORGANIZATION: Hearst
POPULATION / SIZE / METHOD: National / 1001 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 56
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 09/89
QUESTION: Please tell me if you think each of the following events is likely or not likely to happen in the next 10 years. The warming of the earth's atmosphere because of pollution -- known as the greenhouse effect -- will threaten human survival.

48 likely
45 not likely
06 don't know

POLLING ORGANIZATION: Associated Press / Media General
POPULATION / SIZE / METHOD: National Adult / 1071 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 48
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 10/89
QUESTION: [a description of the potential effects of global warming] How would you describe your own view of this issue?

20 extremely worried
40 somewhat worried
24 a little worried
14 not worried at all
02 don't know

POLLING ORGANIZATION: Research Strategy Management for Union of Concerned Scientists
POPULATION / SIZE / METHOD: National voters / 1200 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 20 + 40 = 60
CONTRIBUTION TO EXTREME CONCERN INDEX: 20

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MONTH: 11/89
QUESTION: I am going to read you a list of environmental problems. For each one please tell me whether you think it will get better or worse in the next 10 years: global warming or the greenhouse effect:

63 worse
20 better
17 don't know

POLLING ORGANIZATION: St. Paul Pioneer Press
POPULATION / SIZE / METHOD: St. Paul MN / 752 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 63
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 12/89
QUESTION: [from a list of environmental problems] Would you be willing to pay an extra $50 in taxes to solve the problem . . . Dealing with the greenhouse effect, the gradual warming of the earth?

59 definitely or might be willing
41 possibly or definitely not

POLLING ORGANIZATION: Opinion Dynamic Corp. for Cambridge Energy Research Associates
POPULATION / SIZE / METHOD: National adult / 1250 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 59
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 02/90
QUESTION: Here are some of the things environmentalists have said are problems for us. Would you read down the list and then tell me for each one whether you think it is . . .The greenhouse effect:

49 one of the most serious
29 no more serious than others
06 one of the least serious
16 don't know

POLLING ORGANIZATION: Roper for S.C. Johnson & Son, Inc.
POPULATION / SIZE / METHOD: National adult / 1413 / in person
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 49
CONTRIBUTION TO EXTREME CONCERN INDEX: 49

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MONTH: 02/90
QUESTION: On the subject of the environment, have you heard anything about the greenhouse effect in the atmosphere that could cause global warming?

74 yes
22 no
05 not sure

POLLING ORGANIZATION: Cambridge Reports
POPULATION / SIZE / METHOD: National adult / 1250 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 74
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 03/90
QUESTION: I'm going to mention various problems affecting our environment. While all of these require attention, some are more critical than others and require more immediate action. As I mention each problem I'd like you to tell me how critical you think that problem is [scale of 1 to 5 where 1 = least critical]. The greenhouse effect:

40 level 5, most critical
20 level 4
18 level 3
07 level 2
06 level 1
09 don't know

POLLING ORGANIZATION: Opinion Research Corporation
POPULATION / SIZE / METHOD: National adult / 1046 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 20 + 40 = 60
CONTRIBUTION TO EXTREME CONCERN INDEX: 40

---

MONTH: 03/90
QUESTION: Thinking about the next five years or so, how serious a threat to our national security interests each of the issues is: Manmade changes in the global climate like the greenhouse effect.

22 extremely serious
30 very serious
29 somewhat serious
14 not very serious
05 don't know

POLLING ORGANIZATION: Americans Talk Security
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 22 + 30 = 52
CONTRIBUTION TO EXTREME CONCERN INDEX: 22

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MONTH: 03/90
QUESTION: Here are several goals our nation could try to accomplish over the next five years or so. For each one how important do you feel it should be: Curbing manmade changes in the global climate like the greenhouse effect.

32 extremely important
30 very important
23 somewhat important
11 not very important
04 don't know

POLLING ORGANIZATION: Americans Talk Security
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 32 + 30 = 62
CONTRIBUTION TO EXTREME CONCERN INDEX: 32

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MONTH: 04/90
QUESTION: I'm going to read you a list of environmental problems. As I read each one please tell me if you personally worry about this problem . . . The greenhouse effect or global warming:

30 a great deal
27 a fair amount
20 only a little
16 not at all
06 don't know

POLLING ORGANIZATION: Gallup
POPULATION / SIZE / METHOD: National adult / 1223 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 30 + 27 = 57
CONTRIBUTION TO EXTREME CONCERN INDEX: 30

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MONTH: 05/90
QUESTION: I'm going to list a few environmental issues. Please tell me what you think is appropriate for each one. Global warming known as the greenhouse effect:

34 urgent action
34 prompt action
20 limited action
04 no action
09 don't know

POLLING ORGANIZATION: Associated Press / Media General
POPULATION / SIZE / METHOD: National adult / 1143 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 34 + 34 = 68
CONTRIBUTION TO EXTREME CONCERN INDEX: 34

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MONTH: 06/90
QUESTION: Fuels like oil and coal not only pollute the air but also lead to a build-up of carbon dioxide in the atmosphere which causes global warming. One proposal for reducing this build-up is to impose a special tax on factories and plants that produce carbon dioxide emissions. How do you feel about this?

36 strongly favor
34 somewhat favor
15 somewhat oppose
10 strongly oppose
05 don't know

POLLING ORGANIZATION: Martilla & Kiles and Market Strategies
POPULATION / SIZE / METHOD: National voters / 1004 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 36 + 34 = 70
CONTRIBUTION TO EXTREME CONCERN INDEX: 36

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MONTH: 07/90
QUESTION: We should use more nuclear energy if that will cut greenhouse emissions:

74 agree
20 disagree
06 don't know

POLLING ORGANIZATION: Gallup
POPULATION / SIZE / METHOD: National adult / 1012 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 74
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 08/90
QUESTION: How serious a problem would you say is the greenhouse effect, or the threat of global warming?

37 very serious
33 somewhat serious
16 not very serious
13 don't know

POLLING ORGANIZATION: Rice University
POPULATION / SIZE / METHOD: Texas / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 37 + 33 = 70
CONTRIBUTION TO EXTREME CONCERN INDEX: 37

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MONTH: 10/90
QUESTION: How concerned are you about the problem of global warming or the greenhouse effect?

34 very concerned
38 somewhat concerned
09 not at all concerned
18 haven't heard much about global warming
01 don't know

POLLING ORGANIZATION: Institute for Public Opinion Research - FL International Univ.
POPULATION / SIZE / METHOD: Florida / 1204 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 34 + 38 = 72
CONTRIBUTION TO EXTREME CONCERN INDEX: 34

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MONTH: 11/90
QUESTION: Would you be willing to pay and extra 25 cents per gallon of gas to reduce pollution and global warming?

59 yes
36 no
05 not sure

POLLING ORGANIZATION: Yankelovich Clancy Schulman for Time and CNN
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 59
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 11/90
QUESTION: Would you be willing to pay and extra 50 cents per gallon of gas to reduce pollution and global warming?

48 yes
49 no
03 not sure

POLLING ORGANIZATION: Yankelovich Clancy Schulman for Time and CNN
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 48
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 12/90
QUESTION: [description of U.S. as leading in the emission of carbon dioxide that causes global warming] . . . some have argued that the U.S. should take the lead in fighting global warming. Others have argued that the U.S. should wait until there is an international agreement for all nations to move together to fight this problem. Which do you agree with?

68 U.S. should lead
27 U.S. should wait
05 don't know

POLLING ORGANIZATION: Research Strategy Management for Union of Concerned Scientists
POPULATION / SIZE / METHOD: National voters / 1200 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 68
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 12/90
QUESTION: [description of international carbon dioxide limits] The Bust Administration believes that scientific predictions of global warming are too uncertain and refuses to commit the U.S. to any such limit. Do you believe the U.S. should join other industrial countries in committing to carbon dioxide emissions limits, or should we wait for greater scientific certainty?

69 join other countries
26 wait for more evidence
04 don't know

POLLING ORGANIZATION: Research Strategy Management for Union of Concerned Scientists
POPULATION / SIZE / METHOD: National voters / 1200 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX:
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 03/91
QUESTION: Now I'm going to mention several environmental problems and I'd like you to tell me whether you consider each to be: greenhouse effect, global warming or ozone depletion:

27 very serious problem
33 serious problem
29 only a minor problem
11 no opinion

POLLING ORGANIZATION: Central Surveys Inc.
POPULATION / SIZE / METHOD: Iowa / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 27 + 33 = 60
CONTRIBUTION TO EXTREME CONCERN INDEX: 27

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MONTH: 04/91
QUESTION: I'm going to read you a list of environmental problems. As I read each one, please tell me if you personally worry about this environmental problem . . . the greenhouse effect or global warming?

35 a great deal
27 a fair amount
22 only a little
12 not at all
05 don't know

POLLING ORGANIZATION: Gallup
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 35 + 27 = 62
CONTRIBUTION TO EXTREME CONCERN INDEX: 35

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MONTH: 05/91
QUESTION: Here are some specific environmental problems. For each problem I mention, please tell me how serious it is. Global warming by the greenhouse effect:

22 extremely serious
34 very serious
20 somewhat serious
11 not very serious
14 don't know

POLLING ORGANIZATION: Frederick/Schneiders for Environmental Opinion Study Inc.
POPULATION / SIZE / METHOD: National / 804 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 22 + 34 = 56
CONTRIBUTION TO EXTREME CONCERN INDEX: 22

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MONTH: 08/91
QUESTION: This card lists some things that have been reported in the news recently. Would you please tell me how personally concerned you are about each of these issues - the greenhouse effect:

26 very concerned
38 somewhat concerned
19 not very concerned
06 not at all concerned
11 don't know

POLLING ORGANIZATION: Roper for Citizens for the Environment
POPULATION / SIZE / METHOD: National adult / 1004 / in person
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 26 + 38 = 64
CONTRIBUTION TO EXTREME CONCERN INDEX: 26

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MONTH: 09/91
QUESTION: The last several years in Wisconsin have been warmer than average. Do you think this weather is being caused by a gradual heating of the earth's atmosphere due to the greenhouse effect?

52 yes
34 no
14 don't know

POLLING ORGANIZATION: Wisconsin Policy Research Institute
POPULATION / SIZE / METHOD: Wisconsin / 1013 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 52
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 10/91
QUESTION: How much do you personally worry about the greenhouse effect or global warming?

28 a great deal
24 a fair amount
25 only a little
16 not at all
07 don't know

POLLING ORGANIZATION: Institute for Research In Social Sciences, UNC at Chapel Hill
POPULATION / SIZE / METHOD: North Carolina / 610 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 28 + 24 = 52
CONTRIBUTION TO EXTREME CONCERN INDEX: 28

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MONTH: 12/91
QUESTION: Which of these two statements about global warming is closest to the way you feel?

71 Global warming is a serious problem which our government and society should move aggressively to solve before it gets worse.
19 Since scientists disagree about the causes and level of global warming, there is really no need to take action on it.
10 don't know

POLLING ORGANIZATION: Frederick/Schneiders for Citizens to Preserve Florida
POPULATION / SIZE / METHOD: Florida voters / 503 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 71
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 12/91
QUESTION: Here are some goals that our nation could try to accomplish over the next five years or so. For each one tell me how important it should be. Curbing man-made changes in the global climate like the greenhouse effect.

28 extremely important
38 very important
21 somewhat important
09 not very important
04 don't know

POLLING ORGANIZATION: Market Strategies for Americans Talk Issues Foundation
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 28 + 38 = 66
CONTRIBUTION TO EXTREME CONCERN INDEX: 28

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MONTH: 03/92
QUESTION: As you know, there are many kinds of issues having to do with conservation and the environment, some more important than others. I am going to read you a list of these issues. For each one how serious is it? Global warming, also known as the greenhouse effect:

45 one of most serious
29 fairly serious
14 not that serious
12 don't know

POLLING ORGANIZATION: Roper for Times Mirror
POPULATION / SIZE / METHOD: National adult / 1200 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 45 + 29 = 74
CONTRIBUTION TO EXTREME CONCERN INDEX: 45

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MONTH: 05/92
QUESTION: President Bush has not yet signed an international treaty that would take steps to slow down global warming. Some of Bush's advisors say the treaty will harm our economy. Should Bush sign the treaty if it harms our economy now, but helps the environment in the long run?

58 yes
26 no
15 don't know

POLLING ORGANIZATION: Gordon Black for U.S.A. Today
POPULATION / SIZE / METHOD: National adults / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 58
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 05/92
QUESTION: (see above question) What if signing the treaty would not significantly harm the economy, but would increase the cost of gasoline and electricity. Should Bush sign the treaty?

58 yes
33 no
09 don't know

POLLING ORGANIZATION: Gordon Black for U.S.A. Today
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 58
CONTRIBUTION TO EXTREME CONCERN INDEX:

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MONTH: 05/92
QUESTION: Some people believe the earth's atmosphere is gradually warming and that, in the long run, the warming could have catastrophic consequences. Which of the following best describes your opinion about global warming?

39 it's a major threat
17 it's not really proven
06 it's no threat at all
38 I don't know enough

POLLING ORGANIZATION: Gordon Black for U.S.A. Today
POPULATION / SIZE / METHOD: National adult / 1000 / telephone
CONTRIBUTION TO ABOVE AVERAGE CONCERN INDEX: 39
CONTRIBUTION TO EXTREME CONCERN INDEX: 39
note dual use of this question — question allows 4 response levels yet wording suggests 2

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| | ECI | | HCI | |
|---|---|---|---|---|
| date | score | components | score | components |
| 08/88 | 42 | 42 | 74 | 74 |
| 09/88 | 25 | 28 + 21 | 64 | 75 + 53 |
| 10/88 | 42 | 42 | 59 | 60 + 58 |
| 11/88 | 38* | | 61* | |
| 12/88 | 33* | | 63* | |
| 01/89 | 29 | 29 | 65 | 65 |
| 02/89 | 31* | | 64* | |
| 03/89 | 33* | | 63* | |
| 04/89 | 35* | | 62 | 52 + 56 + 78 |
| 05/89 | 37 | 35 + 39 | 67 | 63 + 72 |
| 06/89 | 34* | | 56 | 56 |
| 07/89 | 30* | | 53* | |
| 08/89 | 27* | | 51* | |
| 09/89 | 23* | | 48 | 48 |
| 10/89 | 20 | 20 | 60 | 60 |
| 11/89 | 27* | | 63 | 63 |
| 12/89 | 35* | | 59 | 59 |
| 01/90 | 42* | | 58* | |
| 02/90 | 49 | 49 | 62 | 49 + 74 |
| 03/90 | 31 | 40 + 22 + 32 | 58 | 60 + 52 + 62 |
| 04/90 | 30 | 30 | 57 | 57 |
| 05/90 | 34 | 34 | 68 | 68 |
| 06/90 | 36 | 36 | 70 | 70 |
| 07/90 | 37* | | 74 | 74 |
| 08/90 | 37 | 37 | 70 | 70 |
| 09/90 | 36* | | 71* | |
| 10/90 | 34 | 34 | 72 | 72 |
| 11/90 | 33* | | 54 | 59 + 48 |
| 12/90 | 32* | | 69 | 68 + 69 |
| 01/91 | 30* | | 66* | |
| 02/91 | 29* | | 63* | |
| 03/91 | 27 | 27 | 60 | 60 |
| 04/91 | 35 | 35 | 62 | 62 |
| 05/91 | 22 | 22 | 56 | 56 |
| 06/91 | 23* | | 59* | |
| 07/91 | 25* | | 61* | |
| 08/91 | 26 | 26 | 64 | 64 |
| 09/91 | 27* | | 52 | 52 |
| 10/91 | 28 | 28 | 52 | 52 |
| 11/91 | 28* | | 61* | |
| 12/91 | 28 | 28 | 69 | 66 + 71 |
| 01/92 | 34* | | 71* | |
| 02/92 | 39* | | 72* | |
| 03/92 | 45 | 45 | 74 | 74 |
| 04/92 | 42* | | 63* | |
| 05/92 | 39 | 39 | 52 | 39 + 58 + 58 |
| n = 21 estimates = 25 (54%) | | | n = 30 estimations = 16 (35%) | |
| * estimated cases | | | | |

**TABLE 3.**
**COMPONENTS OF THE CONCERN INDEX**

This summarizes the components of the high (HCI) and the extreme (ECI) concern indeces. Score is the data value for the month used in the analysis. Component indicates each individual poll question utilized. When multiple questions are used the score represents their average. Estimated cases were arrived at through simple interpolation from adjoining valid observations.

**Intercoder reliability test.**

Five months from the data set were randomly selected and all survey questions for those months were included in the test. A total of 22 questions were included from the complete set of 102 for a sample ratio of approximately .22 . Of the 22 questions in the test, 6 were included in the concern index (.27 compared to the .43 inclusion ratio for the index). The following material was presented to two individuals (a fellow graduate student and a professor) in order to assess the reliability of the concern index:

This is an intercoder reliability test. An important aspect of my research project involves the creation of a "concern index" from a body of public opinion polls supplied by The Roper Center for Public Opinion Research. From all of the questions supplied, I have selected a subset to represent the concern index. The purpose of this test is to evaluate the reliability of my methods by seeing if other individuals would pick the same subset of questions.

The following section is taken directly from the methods chapter of my thesis and describes the creation of the concern index. The methods section is followed by a set of specific instructions for completing the test (copy from methods chapter, pp. 51-52 deleted).

There are 22 questions presented here. You are to mark each one with either a yes or a no to indicate whether or not that specific question meets the criteria for inclusion in the index.

Do not be concerned about how many yes or no responses you generate. This is a random sample and may have no, few, or many yes questions. Here is a summary of the criteria, feel free to refer back to this summary or the above section whenever necessary.

Topic: Question must be about the greenhouse effect. Watch out for questions that might involve the greenhouse effect but really want to know, for example, how important you think a specific consequence of the greenhouse effect might be.

Knowledge: Do not include questions which ask you provide information about the greenhouse effect or ask how concerned you are about various specific possible consequences.

Action: Do include questions that ask your degree of willingness to go along with specific actions to combat the greenhouse effect. These actions might include changing your behavior, spending money, or accepting some technological risk.

Attention: Do include questions that ask how much attention you pay to news about global warming or how aware you are about the topic of global warming.

Politics: To be included, political questions should be more about concern over government response than about politics itself. Do include questions asking how you feel about how our government should respond to the threat of global warming. Do not include questions that relate more to issues like international policy or domestic elections than to concern over government response to global warming.

**Results.** Scott's *pi* evaluates intercoder agreement while controlling for the amount of agreement that could occur by chance. The formula is:

$$pi = \frac{\%\ \text{Observed Agreement} - \%\ \text{Expected Agreement}}{1 - \%\ \text{Expected Agreement}}$$

The Expected Agreement is the sum of the squares of the percentage of correct responses in each category of the test. In this case, out of 22 questions 8 are yes and 14 are no. Expected Agreement is therefore $.36^2 + .64^2 = .54$.

Observed Agreement was:

Researcher with Coder 1 = .91 *pi* = .80

Researcher with Coder 2 = .91 *pi* = .80

Coder 1 with Coder 2 = .95 *pi* = .89

The intercoder reliability reported for this study is the average of the three tests, .83. According to Wimmer and Dominick (1987, p. 186) a coefficient of at least .75 is generally considered acceptable.